HOBART

SERVICE MANUAL

HQC45 MODEL SHOWN 5962

HQC45 & 90 SERIES QUICK CHILLERS

MODEL	ML#
HQC45	ML # 124059
HQC45	ML # 124066
HQCF45	ML # 124060
HQCF45	ML # 124067
HQC90	ML # 124063
HQC90	ML # 124068

- NOTICE -

This Manual is prepared for the use of trained Hobart Service Technicians and should not be used by those not properly qualified. If you have attended a Hobart Service School for this product, you may be qualified to perform all the procedures described in this manual.

This manual is not intended to be all encompassing. If you have not attended a Hobart Service School for this product, you should read, in its entirety, the repair procedure you wish to perform to determine if you have the necessary tools, instruments and skills required to perform the procedure. Procedures for which you do not have the necessary tools, instruments and skills should be performed by a trained Hobart Service Technician.

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GENERAL

INTRODUCTION

Chillers are food processing refrigerators designed for rapidly chilling product from 150° F to approximately 37° F in approximately 90 minutes for reheating at a later time. Quick Freezers are designed for rapidly freezing product as well as rapidly chilling product.

These units aid in preserving food quality, texture and nutritional value.

All of the information, illustrations and specifications contained in this manual are based on the latest product information available at the time of printing.

OPERATION

Refer to the Instruction manual for specific operating instructions.

CLEANING

Detailed cleaning instructions are included with each unit, however, special care must be given to the condenser coil. The condenser coil must be cleaned weekly. This surface must be kept free of dirt and grease for proper system operation. This can be done with a vacuum cleaner using a brush attachment, or a stiff brush or whisk broom. Care must be taken not to damage the condenser coil fins.

TOOLS

Standard

- Standard set of hand tools.
- Temperature tester or thermometer.
- VOM with AC current tester.
- Electrically conductive field service grounding kit (p/n TL84919).

Special

- Refrigeration Reclaiming Equipment
- Acetylene torch
- Nitrogen bottle with gauges
- Refrigeration gauge manifold
- Dial-a-charge
- Valve core removal tool
- Vacuum pump

SPECIFICATIONS

DATA			
	HQC45	**HQCF45**	**HQC90**
H.P.	$1^1/_4$	$1^1/_4$	$1^3/_4$
BTU/HR	9900 @ 25°F Evaporator Temp	8050 @ 0°F Evaporator Temp	14700 @ 25°F Evaporator Temp
Refrigerant Type	R-404A	R-404A	R-404A
Refrigerant Charge (oz)	160	160	160
Cond Unit Amp Draw (RLA)	1 phase = 8.1A	1 phase = 9.0A	1 phase = 12A 3 phase = 8.6A
Evaporator Fans Amp Draw	1.1A	1.1A	1.1A
Voltage	208,240/60/1	208,240/60/1	208,240/60/1
Amps	10.8A	10.8A	13.8A
Optional Voltage	N/A	N/A	208-240/60/3
Optional Amps	N/A	N/A	10.4A

Operating Data		
Refrigerant	R-404A	
Ambient Temperature	70°F	100°F
Suction Pressure PSIG **(Chill Mode)**		
Start of cycle	75	75
End of cycle	28	32
Suction Pressure PSIG **(Freezer Mode)**		
Start of cycle	55	55
End of cycle	5	6
Discharge Pressure PSIG		
Start of cycle	340	420
End of cycle	225	300

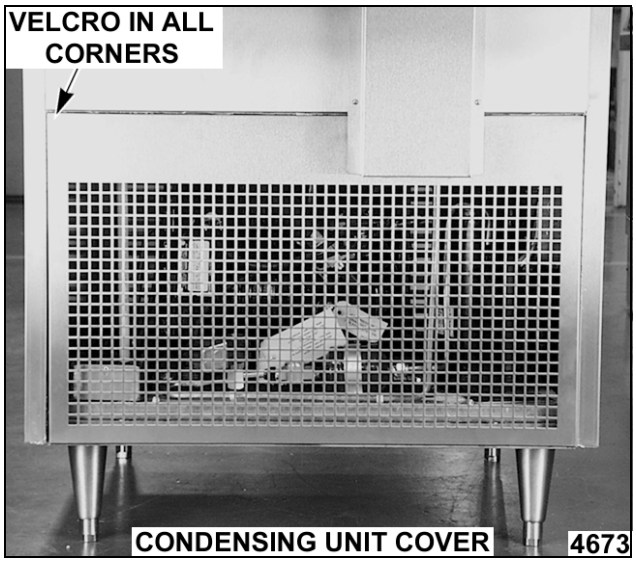
DIMENSIONS (inches)		
	HQC45 HQCF45	**HQC90**
Width	32	32
Depth	37	44½
Height	70	77½
Width (cavity)	28	28
Depth (cavity)	$19^1/_4$	26¾
Height (cavity)	27½	27½
Height to bottom of cavity	27½	35½

REMOVAL AND REPLACEMENT OF PARTS

COVERS AND PANELS

Condensing Unit Covers (Front and Rear)

1. Pull the cover toward you to pull the VELCRO apart at each corner of the cover.

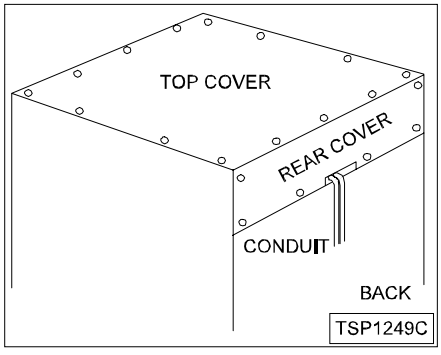


2. Reverse procedure to install.

Top and Rear Covers

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

1. Remove the screws from the edges of the top cover and remove it from the machine.
2. Remove the screws from the edges of the rear cover and remove it from the machine.



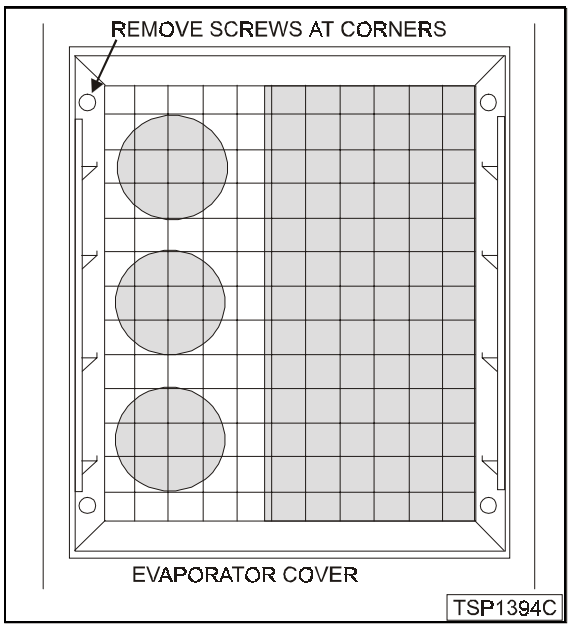
3. Reverse procedure to install.

Evaporator Cover

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

1. Remove the tracks (HQC90) or the shelves and back shelf clips from the cabinet.
2. Remove the screws that secure the evaporator cover and remove it from the cabinet.

NOTE: The evaporator fan panel can be opened.



3. Reverse procedure to install.

CONTROLLER ASSEMBLY

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

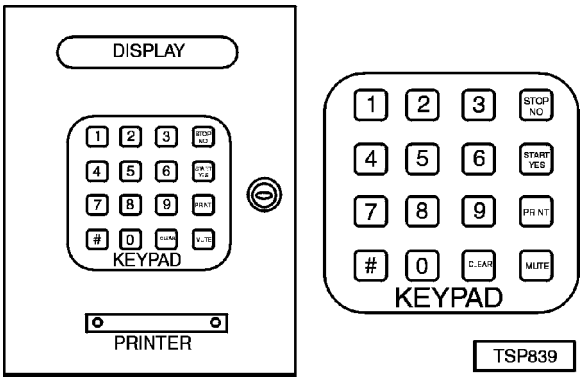
CAUTION: Electro-static discharge will damage the control board. Use a anti-static grounding kit when servicing the computer control box.

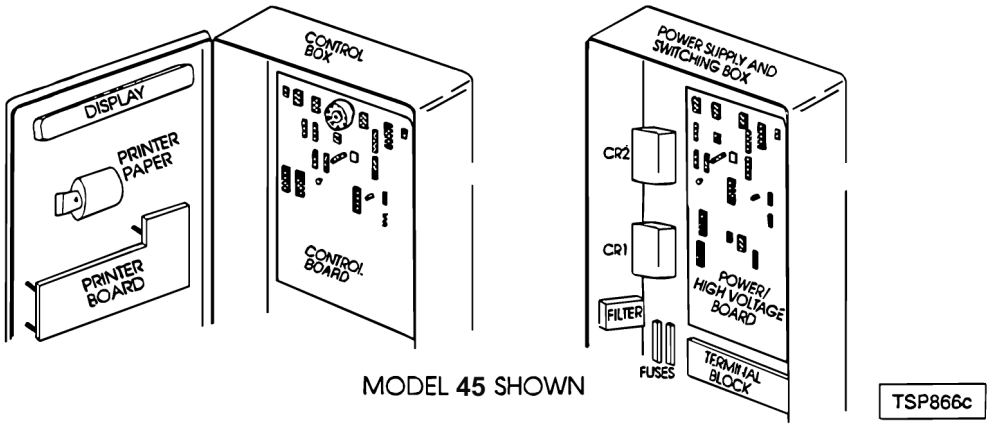
Procedure

1. Remove the top cover as outlined under "COVERS AND PANELS".
2. Disconnect the plugs from the control box or control panel.
3. Remove the connectors from the control box or controller, if necessary.
4. Open the door to the control box or control panel and remove the screws that secure computer control box or controller to front of cabinet.
5. Remove the control box or controller from the cabinet.
6. Reverse the procedure to install.

Removable Components

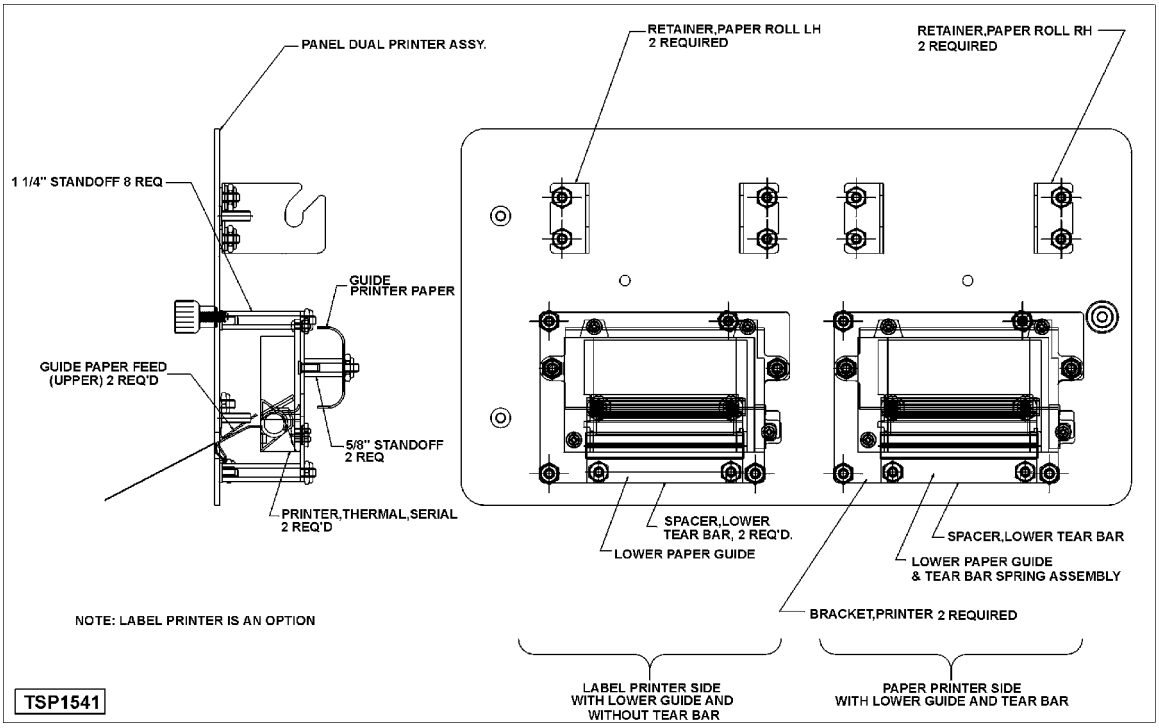
Only for ML-124059,ML-124060,ML-124063

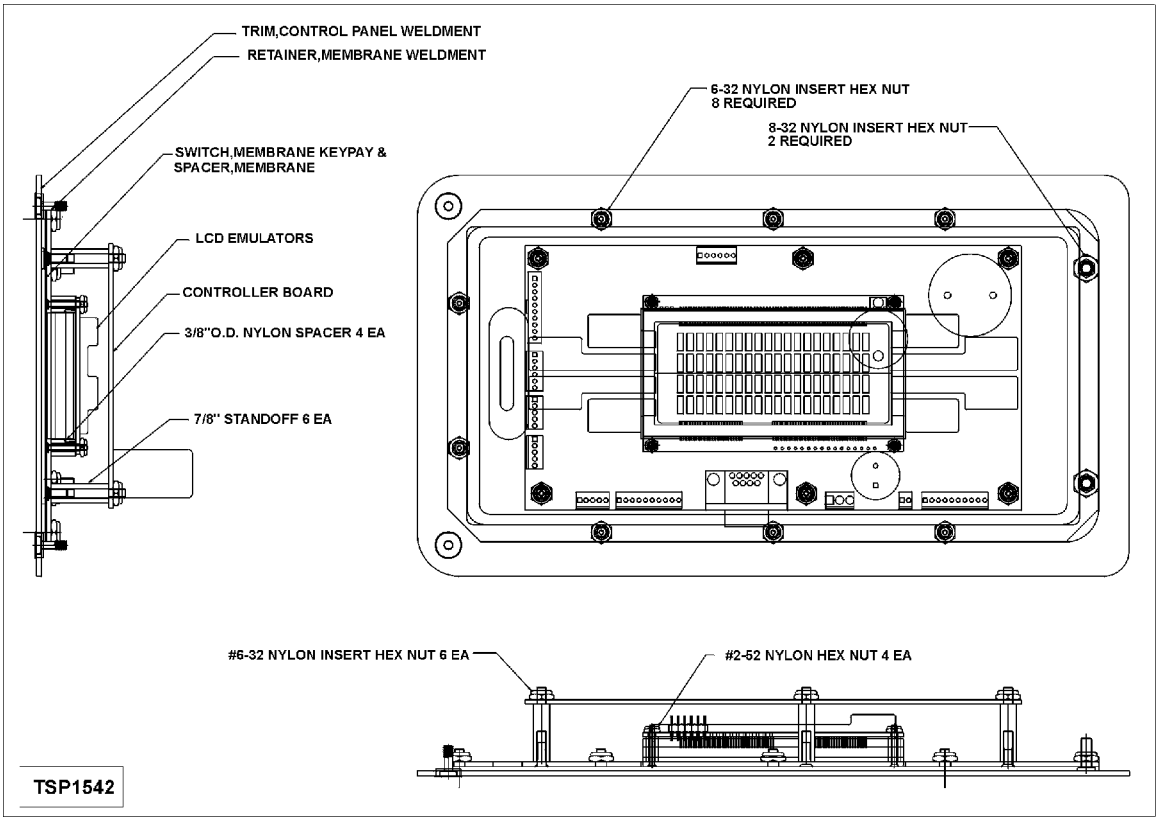




Removable Components

Only for HQC45 ML-124066, HQCF45 ML-124067,HQC90 ML-124068



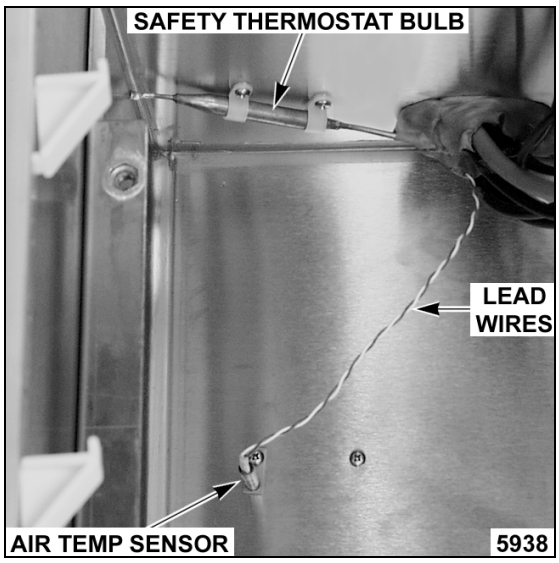


TEMPERATURE SENSORS

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

Air Sensor

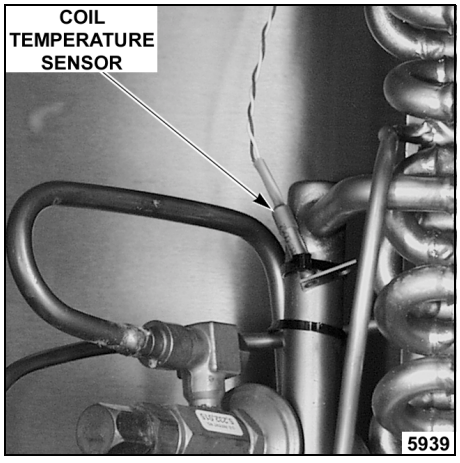
1. Remove the evaporator cover as outlined under "COVERS AND PANELS".
2. Remove the air temperature sensor from its location in the return air duct.
3. Disconnect the lead wires.



4. Reverse procedure to install.

Coil Sensor

1. Remove the evaporator cover as outlined under "COVERS AND PANELS".
2. Remove the air temperature sensor from its location on the evaporator coil.



3. Disconnect the lead wires.
4. Reverse procedure to install.

EXPANSION VALVE

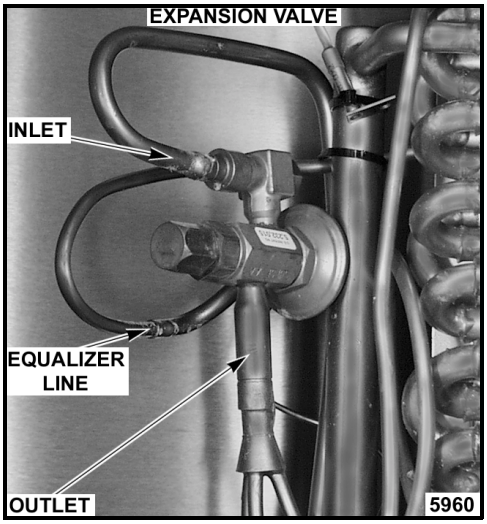
WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

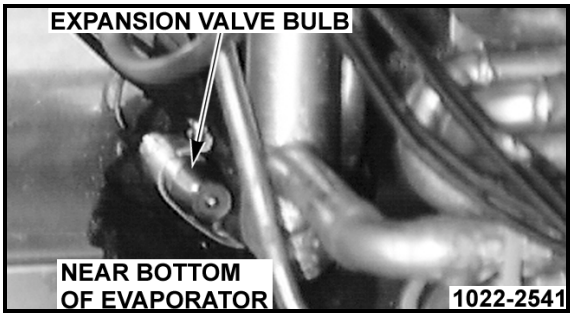
1. Pump-down refrigeration system.

WARNING: AFTER PUMP-DOWN, REFRIGERANT LINES WILL CONTAIN PRESSURE.

2. Access the expansion valve through the front of the cabinet. The expansion valve is located behind the evaporator fans.
3. Detach expansion valve bulb from suction line.
4. Remove expansion valve from the liquid line at inlet and outlet of valve.
5. Install new expansion valve into inlet line and fasten bulb to suction line. Initial setting: 3½ turns counterclockwise.



NOTE: Make sure expansion valve bulb is attached parallel to suction line and makes good contact.



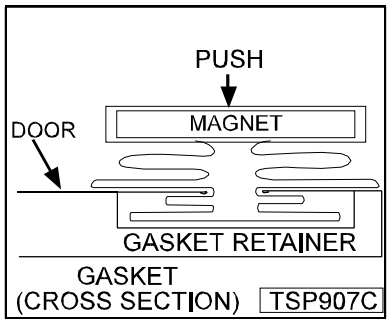
NOTE: Expansion valve bulb must be lower than the diaphragm of the valve.

NOTE: It is recommended that the filter/drier be changed when this part is replaced.

6. Recharge unit and check for leaks.
7. Put unit back into operation and check the superheat as outlined under "TEV SUPERHEAT ADJUSTMENT" in "SERVICE PROCEDURES AND ADJUSTMENTS".

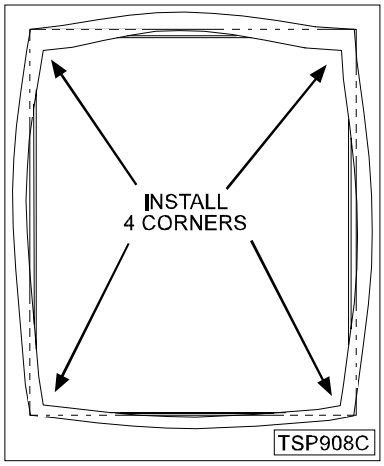
DOOR GASKET

1. Select Stand-by Mode.
2. Open door to maximum position.
3. Remove door gasket by pulling arrow shaped retaining tab from the retaining channel around the outer edge of the door.

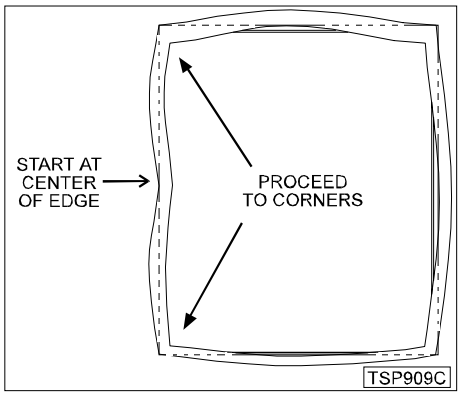


CAUTION: When handling a new door gasket, DO NOT pull on the gasket material. The gasket material will stretch at room temperature and will NOT return to its original length.

4. Position the corners of the gasket at the top corners of the door and push straight in on the gasket until the arrow tab is locked in the retaining channel.



5. Start the center of the top and work the gasket in place from the center to each corner.
6. Install side by starting at the top and working down, making sure the end of the gasket meets with the edge of the door.



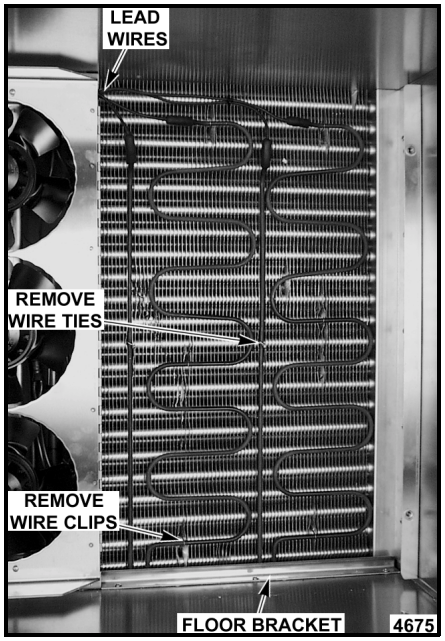
7. Check door for proper operation.

HEATERS

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

Defrost Heater

1. Remove the evaporator cover as outlined under "COVERS AND PANELS".
2. Disconnect wire leads to defrost heater.
3. Unscrew floor bracket in front of the evaporator coil.
4. Remove the copper wires holding defrost heater(s) in place.

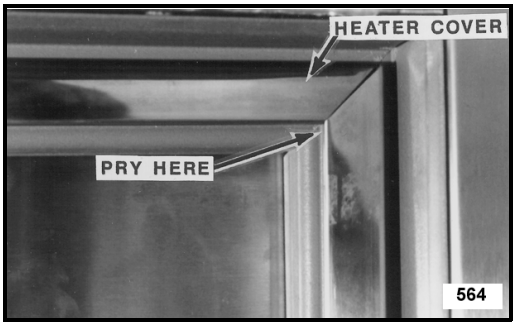


5. Remove the defrost heater from the coil being careful to prevent damage to coil fins.
6. Reverse procedure to install.

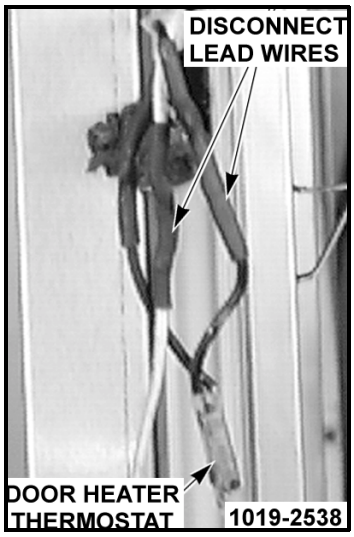
Door Frame Heater

1. Open door past 90°.
2. Remove door frame heater covers from the door frame by gently prying out on the inside edge of the cover.

NOTE: Do not bend the covers. They will be difficult to install.



3. Pull the door frame heater wire loose from the door frame channel.



4. Disconnect the supply lead wires from each end of the heater, and the (green) ground lead wire from one end.
5. Connect lead wires to replacement heater.
6. Insert the heater into the door frame channel.

NOTE: Do not kink heater wire at the corners of the frame.

7. Install heater covers. The horizontal one first.
   A. Hook the inside edge of the heater cover over the lip of the door frame.

NOTE: Check position of heater cover in the top corners of the door frame.

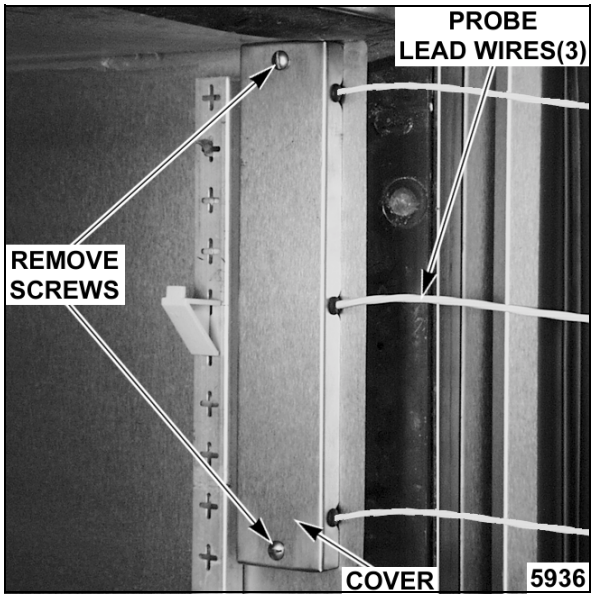
   B. Use your fingers to push the outside edge over the outside lip of the heater channel in the door frame.
   C. Repeat for each side.
8. Check for proper operation of the door and door frame heater.

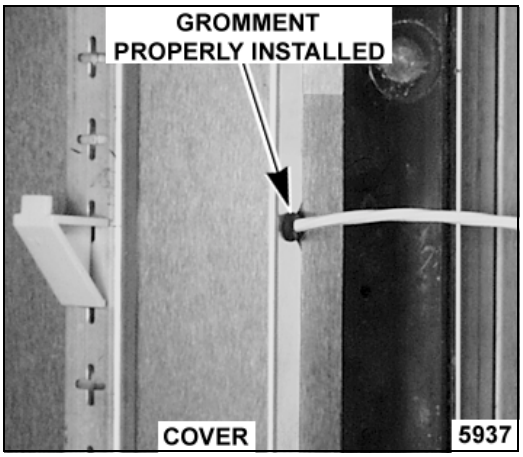
FOOD TEMPERATURE PROBE RECEPTACLE

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

1. Turn chiller OFF or select Stand-by Mode were applicable.
2. Remove the probe receptacle cover.

NOTE: When installing the cover, insure grommets are properly in-place between probe receptacle housing and cover.





3. Unplug the probe.
4. Reverse the procedure to install.

CONDENSING UNIT COMPONENTS

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

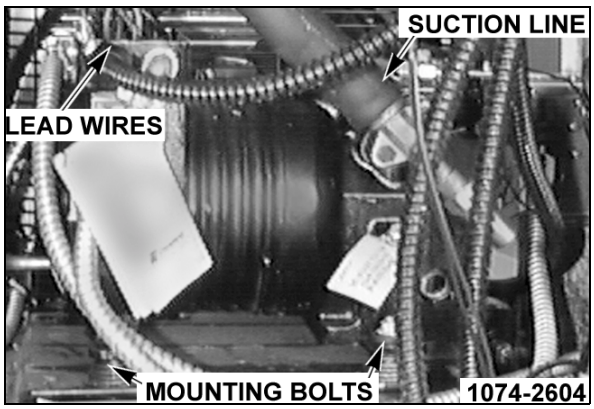
Compressor

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

1. Remove the condensing unit covers as outlined under “COVERS AND PANELS”.
2. Evacuate refrigeration system.

NOTE: The use of reclaiming equipment is mandatory.

3. Disconnect lead wires and conduit at the compressor junction box.
4. Disconnect suction and discharge lines from the compressor.



5. Remove the compressor.
6. Install new compressor and connect wire leads and conduit at compressor junction box.
7. Install a new filter/drier.
8. Evacuate system.
9. Charge system and put unit into operation.

Condenser Fan Assembly

1. Remove the fan guard from the top of the condenser assembly.
2. Remove the screws from the mounting clamps on the front and rear of the motor.
3. Remove the motor and fan assembly from the mounting bracket.
4. To replace the fan blade only, follow steps 4A & 4B. To replace the motor, perform step 4A and proceed to step 5.
   A. Loosen the set screw that secures the fan blade to the motor shaft and remove the fan blade from the motor.
   B. Install the new fan blade with the set screws between the motor and the blades and reverse the procedure to install.
5. Disconnect the lead wires from the motor.
6. Reverse the procedure to install.

Condenser Coil

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

1. Evacuate refrigeration.

NOTE: The use of reclaiming equipment is mandatory.

2. Remove fan guard and fan shroud from condensing coil.
3. Disconnect inlet and outlet lines at the soldered connections nearest the condenser coil.
4. Remove coil from mounting plate.
5. Reverse procedure to install coil, then proceed to next step.

NOTE: It is recommended that the filter/drier be changed when this part is replaced.

6. Evacuate system.

NOTE: The use of reclaiming equipment is mandatory.

7. Charge system and put unit into operation.

Pressure Control

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

1. Pump-down refrigeration system.

WARNING: AFTER PUMP-DOWN, REFRIGERANT LINES WILL CONTAIN PRESSURE.

2. Front seat the suction service valve.
3. Disconnect wire leads to pressure switch.
4. Disconnect capillary tube from compressor fitting.
5. Remove pressure control from mounting bracket.
6. Replace pressure switch and connect capillary tube to compressor fitting.
7. Put unit back into operation.

Filter/Drier

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

Pump-down refrigeration system.

WARNING: AFTER PUMP-DOWN, REFRIGERANT LINES WILL CONTAIN PRESSURE.

1. Remove filter/drier from liquid line.

2. Install a new filter/drier.
3. Evacuate system.

NOTE: The use of reclaiming equipment is mandatory.

4. Charge system and put unit into operation.

EVAPORATOR COIL

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

1. Remove the evaporator cover and top cover as outlined under "COVERS AND PANELS".
2. Pump-down system.

WARNING: AFTER PUMP-DOWN, REFRIGERANT LINES WILL CONTAIN PRESSURE.

3. Remove the defrost heaters as outlined under “DEFROST HEATERS”.
4. Disconnect the suction line at the soldered joint closest to the coil.

NOTE: The use of reclaiming equipment is mandatory.

5. Disconnect the liquid line at the expansion valve.
6. Remove the screws from the coil mounting bracket.
7. Pull the coil out of the cabinet through the front.
8. Reverse procedure to install coil, then proceed to next step.

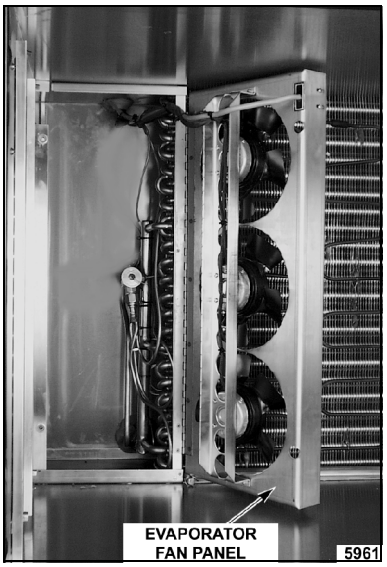
NOTE: It is recommended that the filter/drier be changed when this part is replaced.

9. Evacuate system.
10. Charge system and put unit into operation.

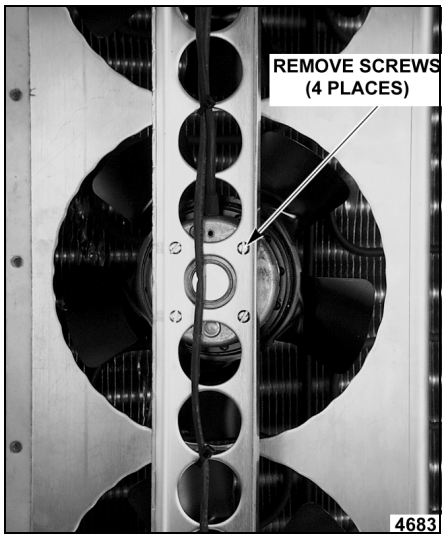
EVAPORATOR FAN

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

1. Remove the top and rear covers as outlined under “COVERS AND PANELS”.
2. Remove the tracks or shelves from the cabinet and remove the shelf clips from the left rear shelf support.
3. Remove the evaporator cover and open the evaporator fan panel as outlined under"COVERS AND PANELS".



4. Disconnect the lead wires at the junction box on the top of the unit and pull them into the cavity with the fan.
5. Remove the bolts that secure the evaporator fan from the housing panel.



6. Remove the fan from the cabinet.

CAUTION: Do not attempt to disassembly motor or remove fan blades from motor, blades are not available as a service part.

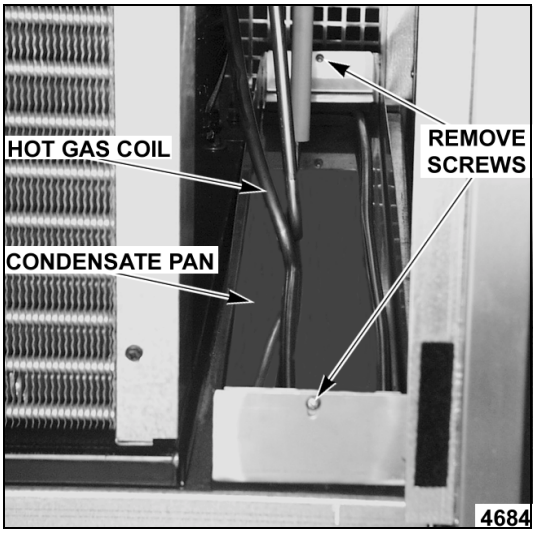
7. Reverse the procedure to install.

HOT GAS CONDENSATE PAN

1. Remove the condensing unit cover as outlined under “COVERS AND PANELS”.
2. Remove the bolts that secure the hot gas coil from the pan.

CAUTION: Do not damage the coil during removal.

3. Lift the hot gas coil out of the pan.
4. Lift the hot gas pan to pull the Velcro apart from the pan to the unit.



5. Reverse procedure to install.

SERVICE PROCEDURES AND ADJUSTMENTS

WARNING: CERTAIN PROCEDURES IN THIS SECTION REQUIRE ELECTRICAL TEST OR MEASUREMENTS WHILE THE POWER IS APPLIED TO THE MACHINE. EXERCISE EXTREME CAUTION AT ALL TIMES. IF TEST POINTS ARE NOT EASILY ACCESSIBLE, DISCONNECT POWER, ATTACH TEST EQUIPMENT AND REAPPLY POWER TO TEST.

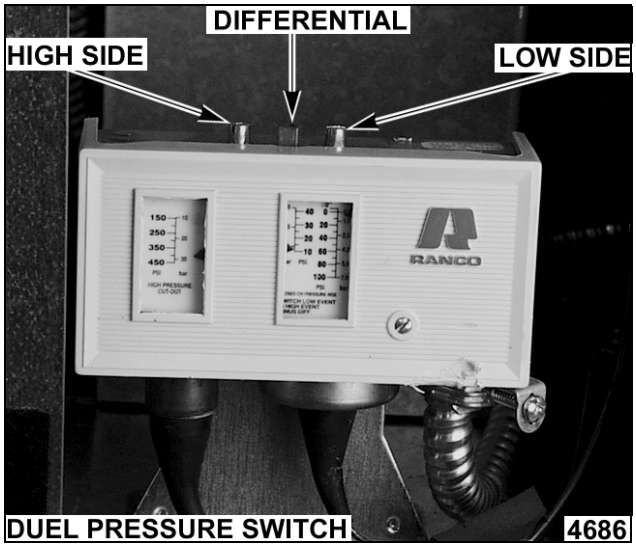
REFRIGERATION CONTROL ADJUSTMENTS

Expansion Valve

1. Access the expansion valve behind the evaporator fans.
2. Remove seal cap from the side of the expansion valve.
3. Turn adjusting stem clockwise and seat valve.
4. Turn adjusting stem 2-1/2 turns counterclockwise. This is the initial setting.
5. Reassemble unit and check for proper operation.

Dual Pressure Control

1. Turn low pressure adjustment "cut-in" screw to the initial setting of **10** psi.
2. Turn diff adjustment screw to the initial setting of **12** psi.
3. Turn high pressure adjustment "cut-out" screw to the initial setting of **440** psi.

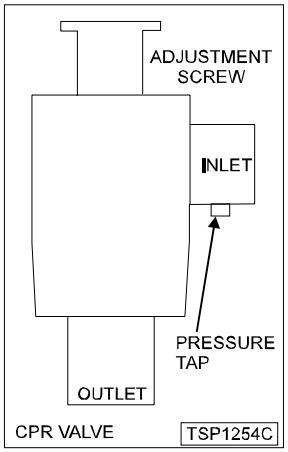


4. Check for proper operation.

CPR Valve

Only for HQC45 ML124059, HQCF45 ML124060, HQC90 ML124063

1. Remove the rear condensing unit cover.
2. Remove the insulation from the valve.



3. Connect the pressure gauge to the suction port of the compressor.
4. Operate the cabinet with the door open or with hot product.
5. Adjust the CPR valve so the maximum pressure is **55** psig.

TEV SUPERHEAT ADJUSTMENT

Introduction

Superheat is the heat that the refrigerant vapor absorbs above the boiling point. Proper adjustment of the superheat will optimize system performance.

Helpful Hints

- Adjustments normally take 10-15 minutes before full impact on the system.
- 8-10 degrees F is a desirable superheat at coil outlet.
- Check suction line temperature and discharge line temperature after any superheat adjustment.

Procedure

1. Access the expansion valve.
2. While the unit is cooling and evaporator fan panel closed, take suction pressure at the compressor inlet or (CPR valve outlet tap were applicable) and temperature readings at the outlet of the evaporator coil.

   NOTE: The closer to the evaporator outlet, the more accurate the readings.
3. Using the Temperature Pressure Chart, convert the pressure reading taken in step 2 into a temperature.
4. Subtract the converted temperature from step 3 from the measured temperature in step 2. This is the superheat.
   A. To increase superheat, turn adjusting stem clockwise.
   B. To decrease superheat, turn adjusting stem counterclockwise.

TEMPERATURE PRESSURE CHART R-404A									
Temperature in ° Fahrenheit					Pressure in lb/in²				
°F	lb/in²	°F	lb/in²	°F	lb/in²	°F	lb/in²	°F	lb/in²
-41	4.0	-20	16.0	0	33.0	20	56.0	40	85.0
-35	7.0	-5	28.0	5	38.0	25	62.0	45	95.0
-30	10.0	-15	20.0	10	44.0	30	70.0	50	105.0
-25	13.0	-10	24.0	16	50.0	35	78.0	55	115.0

CHECKING FOR LEAKS

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

1. Access the refrigeration system.

NOTE: Recover remaining refrigerant based on current EPA guidelines.

2. Connect the low (blue) side of gauge manifold to schrader valve.
3. Connect refrigerant bottle to center of gauge manifold and open valve on bottle to purge hose to manifold gauge.
4. Open valve on low side of gauge manifold and charge system with a small amount of R-22 refrigerant (1 to 2 ounces).
5. Close bottle valve and gauge valve.
6. Disconnect refrigerant bottle and connect nitrogen bottle.
7. Set output valve on nitrogen bottle to equal the appropriate pressure, for the design rated refrigerant at 100°F on the P/T chart.

NOTE: See system data plate for design refrigerant.

8. Open nitrogen bottle valve and gauge manifold valve (low side) and allow pressure to equalize.
9. Shut off both valves and disconnect the nitrogen bottle.
10. Using a leak detector, check for leaks at all tubing connections.
    A. If any leaks are detected, repair leak and recheck for leaks.
    B. If no leaks are discovered, evacuate system as outlined under "EVACUATING SYSTEM".

NOTE: Install a permanent high side access port for future system diagnostics.

11. Charge system as outlined under "CHARGING SYSTEM".

EVACUATING SYSTEM

Introduction

Refrigeration reclaiming equipment is required.

Our goal in system evacuation is to remove all the non-condensing contaminates as possible. No evacuation method will remove 100% of the moisture and air from within the refrigeration circuit. Because of this, guidelines and methods must be developed and adhered to ensuring only harmless amounts of contaminants remain in the system.

Guidelines

- Use only a two stage vacuum pump (2 CFM or greater) and electronic micron gauge.
- Set output valve on nitrogen bottle to equal the appropriate pressure, for the design rated refrigerant at 100°F on the P/T chart.
- Evacuate from high and low sides of system.
- No chemical additive or alcohols are to be used to "dry up" a system.
- Blow down of system with DRY NITROGEN prior to evacuation is acceptable and many times desirable. See "SYSTEM CLEAN UP".
- Evacuate to 200 microns of mercury.

Procedure

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

1. Access the refrigeration system.
2. Connect low (blue) side of gauge manifold to schrader valve on compressor access line and high (red) side of gauge manifold to schrader valve on filter/drier line.

NOTE: If there is no high side access, install a permanent sweat on tap.

3. Connect center line of gauge manifold to vacuum pump.
4. Turn vacuum pump on and open both sides of gauge manifold.
5. Pull a vacuum to 200 microns.
6. Charge system and check for proper operation.

CHARGING SYSTEM

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AT THE MAIN CIRCUIT BOX. PLACE A TAG ON THE CIRCUIT BOX INDICATING THE CIRCUIT IS BEING SERVICED.

WARNING: THIS PROCEDURE REQUIRES THE USE OF REFRIGERANTS. BE CERTAIN THE WORK AREA IS WELL VENTILATED. SAFETY GOGGLES AND GLOVES SHALL BE WORN SINCE REFRIGERANTS MAY CAUSE BURNS TO THE SKIN.

1. Access the refrigeration system.
2. Be sure refrigeration system is checked for leaks and properly evacuated before charging as outlined under "LEAK CHECK" and "EVACUATING SYSTEM".
3. Connect high side of gauge manifold to the liquid line (make certain both valves on the gauge manifold are closed).

NOTE: Put initial charge to system through the high side to prevent liquid refrigerant from reaching the compressor.

4. Connect refrigerant bottle to center connection of gauge manifold (check the refrigerant bottle to confirm direction for liquid).
5. Purge the hose from the refrigerant tank to the manifold gauge.

6. Open high side of gauge manifold and allow appropriate amount of refrigerant to flow into the refrigeration system.
   A. Shut off gauge and bottle valves when this has been accomplished.
7. Disconnect the hose from the receiver valve.
8. Reconnect power to the unit and check for proper operation and high pressure leaks.

NOTE: Adjust charge as needed based on superheat and operating pressures. Through low side of system.

9. Disconnect power to the unit, replace any panels and covers removed.
10. Reconnect power to the unit.

SYSTEM CLEAN UP

Introduction

When a refrigeration system is accessed in service, some degree of system clean up is required. There are two levels of clean up:

- Basic - Conduct procedure as outlined under "EVACUATING SYSTEM" and incorporating a drier change, this is recommended only when system exposure is limited.
- Massive - The use of Polyol Ester (POE) oil in systems using R-134a and R-404a, as well as in many other applications, require that every system failure be treated as a Massive clean-up.

Massive Contamination

If a compressor burn out or failure has occurred, do not install a new compressor until the clean-up procedure has been completed.

If a massive moisture contamination or POE oil breakdown has occurred, remove the old compressor as outlined under "CONDENSING UNIT COMPONENTS" in "REMOVAL AND REPLACEMENT OF PARTS" drain the oil and hold for installation.

1. Recover refrigerant based on current EPA guidelines.
2. Remove filter/drier and metering device.

NOTE: In POE oil applications, it should always be assumed that the metering device is restricted after a contamination. These devices **can not** be flushed clean and reused.

3. Flush high and low sides of refrigeration system with Nitrogen to displace any trapped oil and contaminates.
4. Reassemble refrigeration system to include compressor, 032 size liquid line drier and new metering device.

NOTE: The use of low flow Nitrogen through the system while welding is mandatory to prevent oxidation/carbon plating that will lead to further contamination.

NOTE: The use of a suction drier is recommended when moisture contamination is present. The suction drier should be removed within 48 hours of installation to prevent further performance issues. Also install a new liquid line drier for maximum system clean up.

5. Replace new oil into the compressor.
6. Purge system with Nitrogen for 5 minutes. Pressure should be applied to the high side and allowed to vent through the port on top of the compressor.
7. Evacuate system for 30 minutes.
8. Repeat steps 5 and 7 two additional times.

NOTE: The final vacuum should be 200 microns or less.

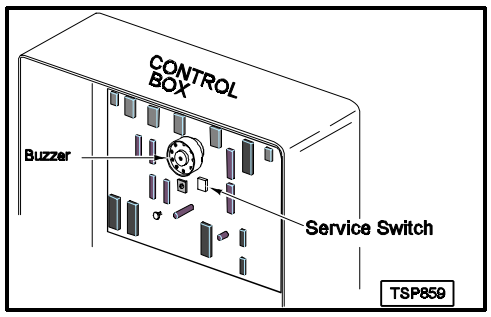
9. Charge the system as outlined under "CHARGING SYSTEM".
10. Replace any panels and covers removed.
11. Reconnect power and check for proper operation.

SERVICE MODE ML-124059, ML-124060, ML-124063

The Service Mode allows service personal to exercise the loads and monitor the input of the Control independently to determine if the Control, the electro-mechanical components and the refrigeration system are operating properly.

WARNING: THIS PROCEDURE REQUIRES THAT THE CONTROL BOX BE OPEN WHILE THE POWER IS SUPPLIED TO THE MACHINE. EXERCISE EXTREME CAUTION AT ALL TIMES.

1. The unit must be in the idle mode.
2. Open the control box.
3. Locate the service switch on the control board. Push and hold the service switch, then push the 9 key on the keyboard. A maintenance menu will be displayed.



Maintenance Menu = 1 = Inputs, 2 = Outputs, 3 = Clock, 4=Printer

INPUTS

Press	Display (Top Line)	Display (Bottom Line)	Explanation
1	Front door switch	on or off	Status of input
yes	External defrost	on or off	Status of input (Not used)
yes	External defrost	on or off	Status of input (Not used)
yes	Spare switch input	on or off	Status of input
yes	AIR temp. - PROBE 1 - PROBE 2.	PROBE 3 - PROBE 4 - COIL temp.	Analog to digital values for probes
yes	AIR temp. - PROBE 1 - PROBE 2.	PROBE 3 - PROBE 4 - COIL temp.	Fahrenheit values for probes
yes	Current Probe		Not used
yes	Return to front door switch		
no	Maintenance Menu		

OUTPUTS

Press	Display (Top Line)	Display (Bottom Line)	Explanation
2	Defrost heaters = off	0 = off, 1 = on	Watch LED 2 on control board
yes	Evaporator fan = off	0 = off, 1 = on	Watch LED 5 on control board
yes	Solenoid valves = on	0 = off, 1 = on	Watch LED 3 & 4 on control board
yes	Freezer solenoid = off	0 = off, 1 = on	Watch Led 3 (Not used)
yes	Remote alarm = off	0 = off, 1 = on	Watch LED 1 on control board
yes	Buzzer = off	0 = off, 1 = on	Audible signal
yes	Defrost heaters		
no	Maintenance Menu		

CLOCK

Press	Display (Top Line)	Display (Bottom Line)	Explanation
3	Enter new time	current time setting in memory.	Use number keys to change time (hrs/ mins/sec)
yes	Enter new time	HR:MN:SC / 0 = AM 1 = PM	
yes	Enter new date	current date setting in memory.	Use number keys to change date (mo/day/yr)
yes	Enter new time		
no	Maintenance Menu		

PRINTER

Press 4 - Display will flash “SENDING TEST PATTERN TO PRINTER” and return to the maintenance menu.

If there is an error in the print operation, a message will be displayed.

If the error occurs during the test print sequence, that error will only be displayed if print is selected again.

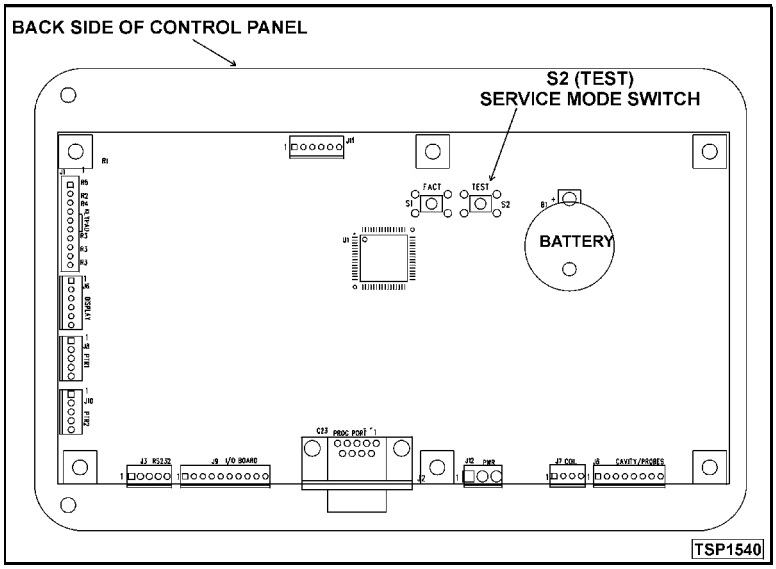
SERVICE MODE ML-124066, ML-124067, ML-124068

The Service Mode allows service personal to exercise the loads and monitor the input of the Control independently to determine if the Control, the electro-mechanical components and the refrigeration system are operating properly.

WARNING: THIS PROCEDURE REQUIRES THAT THE CONTROL BOX BE OPEN WHILE THE POWER IS SUPPLIED TO THE MACHINE. EXERCISE EXTREME CAUTION AT ALL TIMES.

CAUTION: Electro-static discharge will damage the control board. Use a anti-static grounding kit when servicing the computer control box.

1. Turn power off to the unit.
2. Loosen the control panel screws and swing open control panel to gain access to service mode switch.



3. Locate the service mode switch on the back of control board, press and hold switch while turning power ON to chiller. The following menu will be displayed.

NOTE: To exit the service mode at any time, turn power OFF and back ON to display user main menu.

LAST DATE OF SERVICE	
00/00/00	
< UPDATE	
< SET CLOCK	NEXT >

A. Pressing the button beside UPDATE sets last date of service date to current date. If date is INVALID, set clock to current date and time.

B. SET CLOCK - Displays set clock menu to change the last date of service.

SET CLOCK	MONTH
↓ XX/XX/XX	XX:XX ↑
< BACK	NEXT>
< CANCEL	ENTER

1) Pressing the button beside BACK or NEXT toggles through selection options: MONTH/DAY/YEAR/HOUR/MINUTE.
2) Pressing the button beside the up or down arrows changes the selected date or time numbers.
3) Pressing the button beside ENTER saves the new date and time selected and displays on the last date of service menu.
4) Pressing the button beside CANCEL does not save any change to date or time and return to the last date of service menu.

C. NEXT- With the last date of service menu displayed, pressing the button beside NEXT the following service menu will be displayed.

< SERVICE MENU	**DOOR >**
< REFR/AIR	**DEF/COIL >**
< PROBES/ALARM	**FANS >**
< PRINTER	**DISPLAY >**

NOTE: From service menu, the following Service modes can be selected:

- SERVICE MENU - Diagnostic test.
- REFR/AIR - Refrigeration System and Air probe test.
- PROBES/ALARM - View current probes reading and change status of ALARM output.
- DISPLAY - Illuminates entire display.
- DOORS - Displays status (OPEN or CLOSED)
- DEF/COIL - Defrost System and Coil probe test.
- FANS - Tests Fan outputs
- PRINTERS – Sends test pattern to printer(s).

D. SERVICE MENU - Diagnostic test.

< DIAGNOSTIC	**MAXIMUM >**
< RUN CYCLES	**MINIMUM >**
< SINCE DEF.	**FAILURE >**
CYCLES	**CLEAR >**

NOTE: The selected item will have a flashing "**<**" or "**>**" beside it.

1) Pressing the button beside DIAGNOSTIC returns to the service menu.

2) Pressing the button beside RUN CYCLES displays (in the lower left corner of the display) the number of cycles ran since last cleared.

3) Pressing the button beside SINCE DEF. displays (in the lower left corner of the display) the number of cycles ran since last defrost.

4) Pressing the button beside MAXIMUM displays (in the lower left corner of the display) the maximum air temperature in cabinet.

5) Pressing the button beside MINIMUM displays (in the lower left corner of the display) the minimum air temperature in cabinet.

6) Pressing the button beside FAILURE displays (in the lower left corner of the display) the failure since last service cleared. If there is more than one failure, pressing the lower left button will cycle through all failures. Below is a complete list of all possible failures.

DEFR HEAT= Defrost heater malfunction.

SYSTEM FAIL= Chiller not cooling properly.

OVER TEMP= Internal air temperature exceeds 150°F.

CONTROL= Control board malfunction.

INTERRUPTED= A chilling cycle has been interrupted either by loss of main power or inadvertently switching power switch OFF.

PROBE= One of the probes have malfunctioned: Air, Coil, or Product.

PRINTER= Printer not responding or out of paper/label.

7) Pressing the button beside CLEAR clears the current item.

E. REFR/AIR – Refrigeration System and Air probe test.

REFRIGERATION TEST:	
< REFR:	**OFF**
AIR TEMP:	**14°F**
< COMP USAGE	**BACK>**

1) Pressing the button beside REFR can test the compressor function. The options for the REFR are: OFF, ON, or ON&FANS.

OFF= Refrigeration not operational.

ON= Refrigeration operational.

ON&FANS= Refrigeration and evaporator fans operational.

2) The current Air temperature inside the cavity is also displayed.

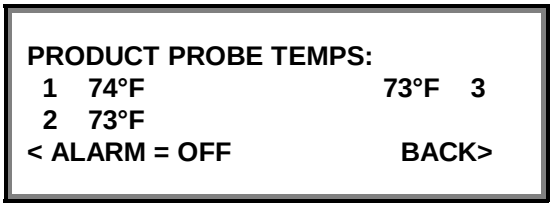
3) The service menu can be reached by pressing the button beside BACK and all outputs will return to their off state.

4) COMP USAGE – Displays days & hours since the last cleaning of condensor coil.

NOTE: After cleaning the condensor coil, press the button beside cleaned coil to reset the day & hour both to read 0.

5) The previous menu can be reached by pressing the button beside BACK and all outputs will return to their off state.

F. PROBES/ALARM – View current probes reading and change status of ALARM output.

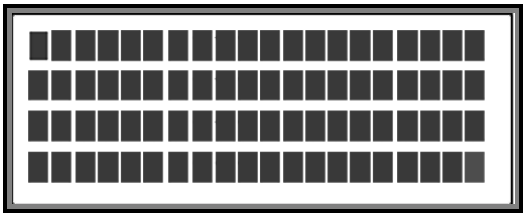


1) This screen displays the value of each product probe. If no value(s) shown find the source of the problem.

2) The alarm output can also be changed from OFF to ON.

3) Pressing BACK displays the service menu and the alarm output returns to the off state.

G. DISPLAY – Illuminates entire display, see below. Pressing any key will return to the service menu. This option can also be used as a test for the keypad, since any key press will return to the previous menu.



NOTE: If the screen does not display as shown display board needs replaced. If display does not return to the service menu then keypad needs replaced.

H. DOORS – Displays status (OPEN or CLOSED).

NOTE: Cycling the door open and closed shows the status of compartment door. If not find the source of the problem.

1) Pressing BACK displays the service menu.

I. DEF/COIL – Defrost System and Coil probe test.

1) The defrost heat can be turned OFF or ON by pressing the heater button.

OFF= Defrost heater should not be energize.

ON= Defrost heater should energize and coil temperature should slowly increase.

2) The coil temperature is also displayed. If not find the source of the problem.

3) Pressing BACK displays the service menu and turns the heater off.

J. FANS – Tests Fan outputs.

```
FAN MODE TEST:
<          FAN =    NONE
  FAN DOOR =   CLOSED
                          BACK >
```

1) Pressing the FANS button test the evaporator fans function. The options for FANS are: NONE, SET1, SET2 and BOTH.

   NONE= All evaporator fans de-energized.

   SET1= This is the low air flow mode for the soft chill mode. Only one evaporator fan energized. If not find the source of the problem.

   SET2= Two evaporator fans energized. If not find the source of the problem.

   BOTH= All evaporator fans energized. If not find the source of the problem.

2) Pressing BACK displays the service menu and turns the fan(s) off.

K. PRINTERS – Sends test print out to printer(s).

```
PRINTER TEST:

< RECORD:    READY
< LABEL:     READY
                          BACK >
```

NOTE: LABEL: READY not displayed if label printer is not an option.

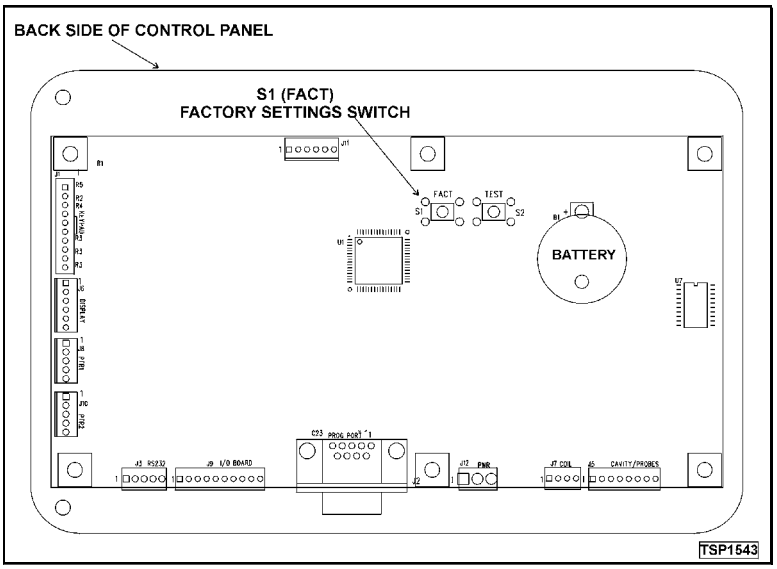
1) Pressing the button beside RECORD sends a test print out to the paper printer. The READY changes to RUNNING, then to SUCCESS if the print finishes successfully. Otherwise ERROR is displayed and find the source of the problem.
2) If the Label printer option is installed, the LABEL test can be ran by pressing the button beside LABEL to send a test print out.
3) Pressing BACK displays the service menu.

FACTORY SETTINGS MODE ML-124066, ML-124067, ML-124068

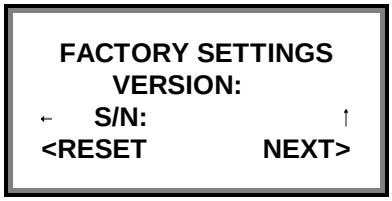
WARNING: THIS PROCEDURE REQUIRES THAT THE CONTROL BOX BE OPEN WHILE THE POWER IS SUPPLIED TO THE MACHINE. EXERCISE EXTREME CAUTION AT ALL TIMES.

CAUTION: Electro-static discharge will damage the control board. Use a anti-static grounding kit when servicing the computer control box.

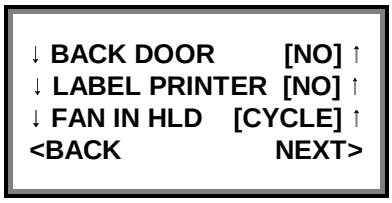
1. Turn power OFF to the unit.



2. Loosen the control panel screws and swing open control panel to gain access to factory settings mode switch.
3. Locate the factory settings mode switch on the back of display board, press and hold switch while turning power ON to chiller. The following factory settings menu will be displayed.

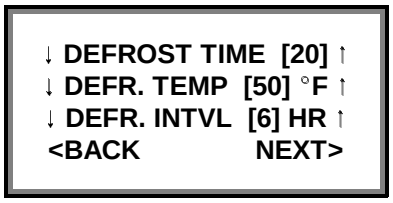


4. Enter the units serial number by selecting the left arrow next to **S/N** changes which digit to edit in serial number, and the up arrow increments the value of the selected digit.
   RESET- Resets all the parameters to the factory preset values, and erases all recorded cycles in memory.
   NEXT- Continues to the next factory setting menu.



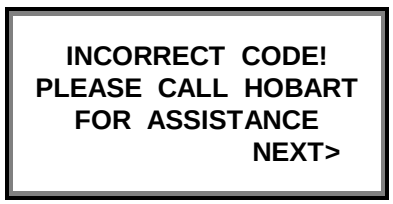
5. BACK DOOR- Is not an option, select no.
6. LABEL PRINTER- Options are:
   OFF= No label printer.
   ON= Individual labels.
   CNT= Continuous labels.
7. FANS IN HLD- [CYCLE] Fans are defaulted to cycle ON and OFF. Select [CONT] for continuous fan operation during hold mode.

8. BLASTING DIFF- Blasting differential is the temperature difference between the set point temperature and the actual temperature for opening the compressor solenoid when in chill or freeze mode.
9. HOLDING DIFF- Is the temperature difference for hold mode.
10. ANTI SHORT- Is the minimum time between closing and opening the compressor solenoid.

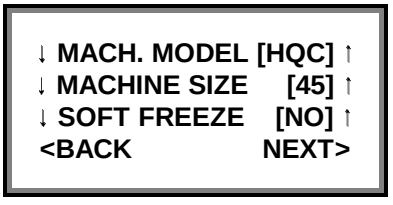


11. DEFROST TIME- Is the length of defrost time in minutes.
12. DEFROST TEMP- Is the set point for the coil temperature.
13. DEFROST INTVL- Is the time interval between automatic defrosts.

14. The security code is the last seven digits of the serial number reversed. The left arrow selects which digit to adjust, and the up arrow increments the value of the selected digit.
15. Press Enter to continue to secured options or Exit to exit the factory settings mode.



16. If the incorrect security code was entered, the following screen will be displayed.



17. MACH. MODEL- Select the type of model either HQC or HQCF
    NOTE: Do not select HQF, FQC, FQF, or FQCF models.
18. MACHINE SIZE- Select the machine size either 45 or 90
    NOTE: Do not select any other size than actual chiller size.
19. SOFT FREEZE- Allows chiller to perform a soft freeze.
    NOTE: This should remain NO unless instructed otherwise.

↓ **FREEZE MAX [20] °F** ↑ ↓ **SFT FRZ MIN [-5] °F** ↑ ↓ **DEFROST TYPE [ELE]** ↑ **<BACK NEXT>**

20. FREEZE MAX- Is the maximum selectable value for freezing the HQCF model chiller.
21. SOFT FRZ MIN- Is the minimum selectable value for soft freeze.
22. DEFROST TYPE- Is selection for chiller to defrost by [ELE] (defrost heating element) or [GAS] (refrigeration compressor).

    NOTE: This should remain [ELE] unless instructed otherwise.

FACTORY SETTINGS **DO YOU WISH TO SAVE** **THESE NEW SETTINGS?** **<NO YES>**

23. YES- Saves the settings to memory.
24. NO- Exit without saving changes.

SAVING SETTINGS **PLEASE WAIT. . .**

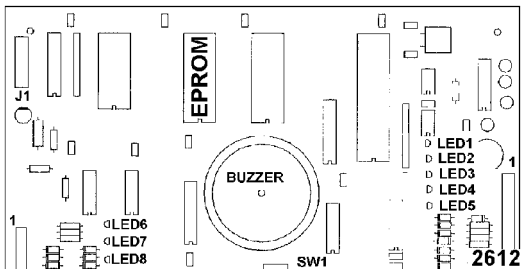
25. This display will be shown while the settings are being saved.

FACTORY SETTINGS **SETUP IS COMPLETE!** **RESTART CONTROLLER**

26. When the settings have been saved, restart the controller by turning power OFF then back ON.

SOFTWARE VERSION ML-124059,ML-124060,ML-124063

The control program software version can be determined by pressing the 0 key when the main menu is displayed. The display will show "REV 2.1"; “MODEL2"; “PUSH 0 TO EXIT”. **(2L is the current version)** The version will match the version printed on the E-Prom. The E-Prom is located on the control board in the control box.



IMPORTANT NOTE: Any change in the software could affect the operation of the Chiller. **ALWAYS** check the software version before servicing this unit or calling for technical assistance.

SOFTWARE VERSION ML-124066,ML-124067,ML-124068

The control program software version is displayed during initialization when unit is turned on. The display will show the chiller model number and the current software version number.

Smart Chill **HQC 45 or 90** **INITIALIZING** **VERSION: X.XX**

CONTROLLER SERVICE PROCEDURES ML-124059,ML-124060, ML-124063

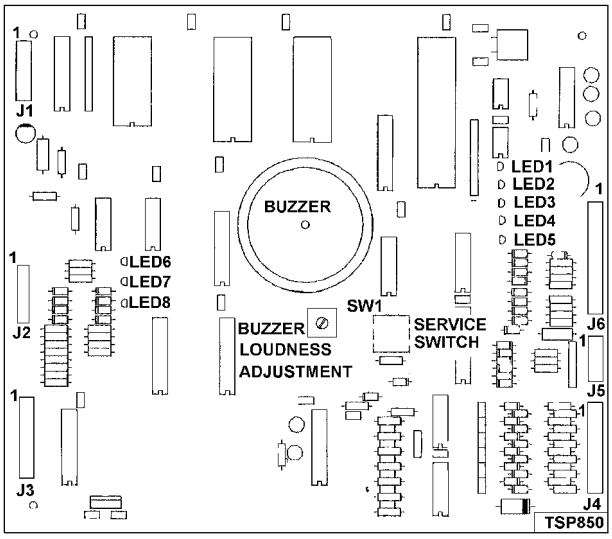
Controller Board

The controller board has a series of LEDs to assist in troubleshooting. When the LED is lit, the component should be energized.

LED	COMPONENT	LED	COMPONENT
1	Remote Alarm	5	Evaporator Fan
2	Defrost Heater	6	Controller*
3	NOT USED	7	NOT USED
4	Refrigeration Solenoid	8	NOT USED

*LED #6 blinks on and off at one second intervals when the controller board is energized.

The service switch is located near the center of the board. The buzzer loudness pot is located near the center of the board, below the buzzer.



Voltage check for 13.5 (±1.5) VDC to Controller Board if LED 6 is not flashing.

1. Check between TP 8 & 9 on high voltage board for 13.5 VDC.
2. Check the cable connections between the high voltage board and the controller board.
   A. Pins 5 & 6 are ground on J2 (high voltage board) and J6 (controller board).
   B. Pins 3 & 4 are +12VDC on J2 (high voltage board) and J6 (controller board).
   C. Check these pins at cable connections P17, J10/P10, P9/J9, and P6.

Voltage check for +5VDC to Printer Board.

1. Check for +5 VDC on pins J3-15, J3-16, J3-17.
2. Check for 0V on pins J3-18, J3-19, J3-20.

Voltage check for +5VDC to Display.

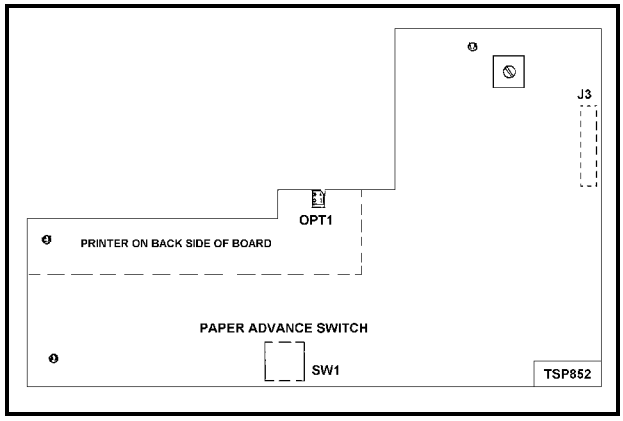
1. Check for +5VDC between J1-1 and J1-2 on controller board.
2. Check these pins at cable connections J1 and P1.

Printer Board

The printer board monitors the speed of the paper feeding through the printhead.

If the speed is not normal, “Printer Error” is shown on the display. A paper jam or a mechanical problem with the printer can be the cause.

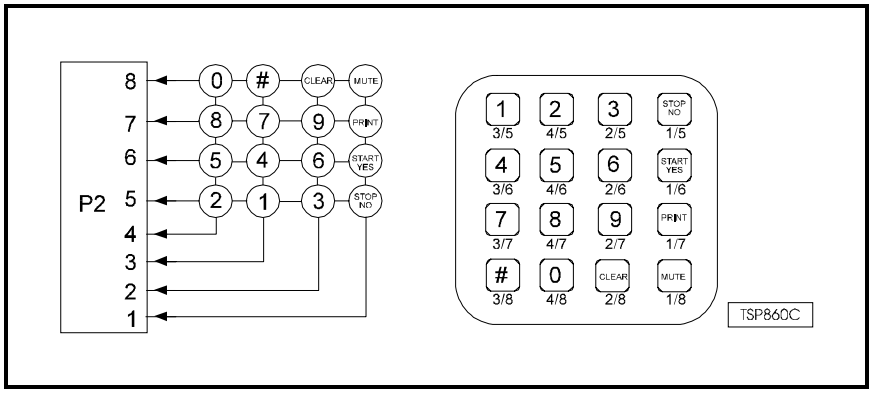
To reset the printer you must remove the power from the unit for a minimum of five seconds. If the power is removed from the unit for less than ten minutes, it will return to the point in the cycle at which the interruption occurred.



1. Inspect the printer for a paper jam or roll feeding incorrectly.
2. Remove the paper from the printer and reload the paper.
3. Reset the controller and try to print.
4. If the error occurs again and its not a paper problem, replace the printer board.

Keypad

1. Disconnect P2 from J2 on the controller board.
2. Perform a continuity test between the pin numbers (P2) for the appropriate key.
3. Use the 200 scale on a digital meter. When the key is pressed, the reading should be between 15 and 40 ohms.



Power/High Voltage Board

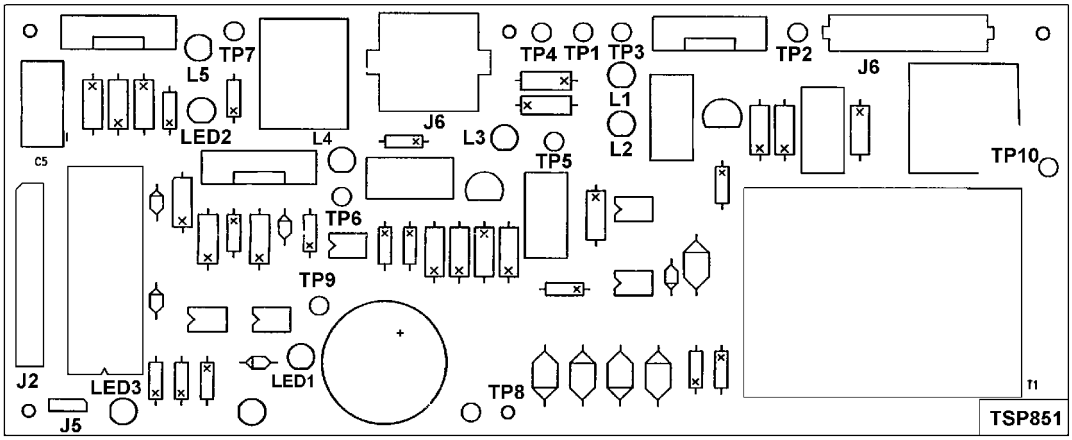
The power board has a series of LEDs lamps and test points to assist in troubleshooting.

When the LED or lamp is lit, the component should be energized.

LAMP	COMPONENT	LAMP	COMPONENT
L1	Refrigeration Solenoid	L3	Heater control
L2	Evaporator Fan	L4	NOT USED

LED	COMPONENT	LED	COMPONENT
1	Power Board	3	NOT USED
2	Remote Alarm		

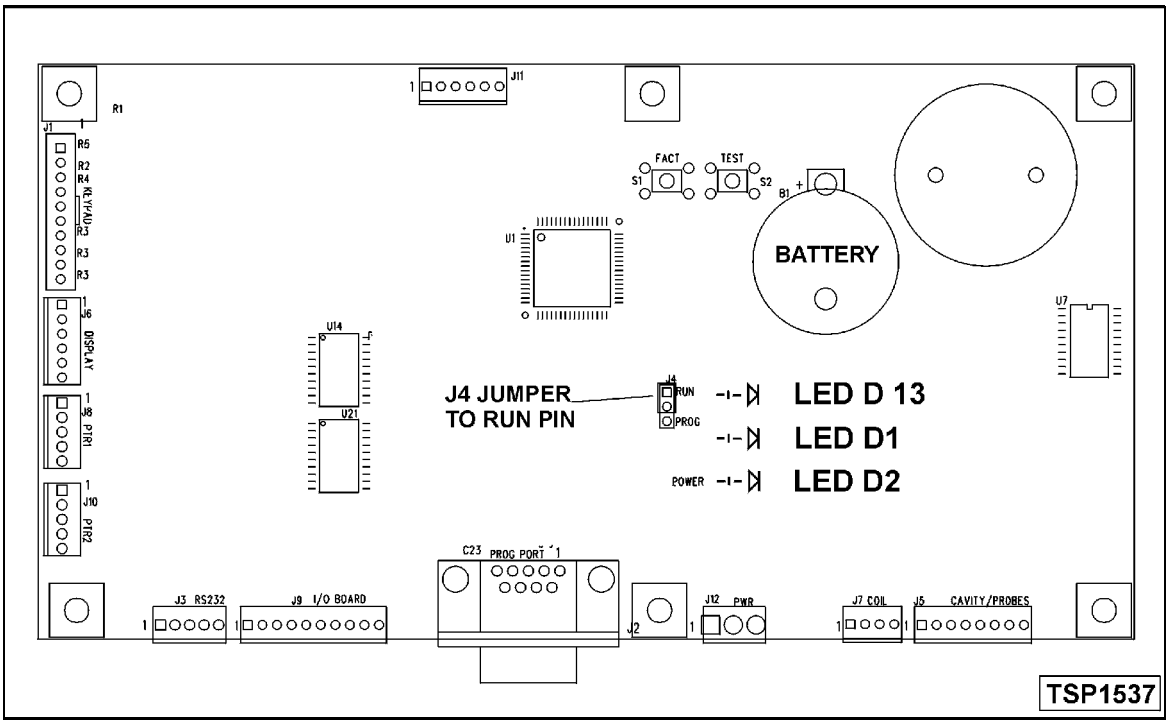
TEST POINT	COMPONENT	VOLTAGE
1	L2	Supply Voltage
2	Neutral Line	0 V
3	Local Solenoid	120 V
4	Fan Control	120 V
5	Heater Control	120 V
6	Remote Solenoid	120 V
7	Not Used	
8	Printer & Controller	+ 12 V
9	Chassis & Signal Ground	0 V
10	L1	Supply Voltage



CONTROLLER SERVICE PROCEDURES ML-124066, ML-124067, ML-124068

Controller Board

The controller board has two LED's to assist in troubleshooting. LED (D2 POWER) is lit= indicates that power is supplied to the controller board. LED (D1) is flashing= indicates that I/O board and control board are communicating. If not, check all harness connections to communication cables going between I/O & controller boards. LED (D13) is not used.



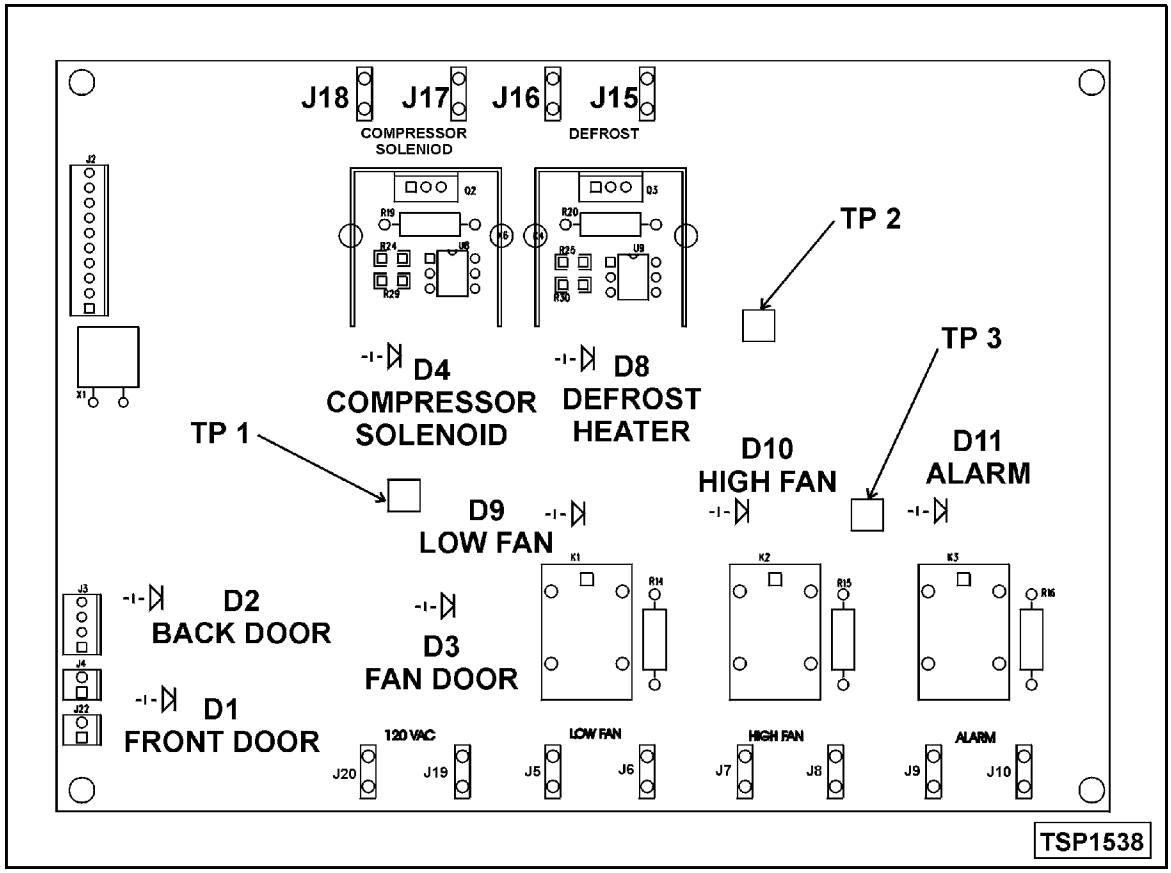
I/O Board

The I/O board has a series of LED's and test points to assist in troubleshooting. When the LED is lit, the component should be energized or input open.

LED	COMPONENT	LED	COMPONENT
D1	Front Door	D8	Defrost Heater
D2	NOT USED	D9	Low Fan
D3	Fan Door	D10	High Fan
D4	Compressor Solenoid	D11	Alarm

TEST POINT	COMPONENT	VOLTAGE
TP1	Relays	+12VDC
TP2	Logic Circuit	+5VDC
TP3	Ground	0V
J17, J18	Triac Compressor Solenoid	0.75 - 2VAC voltage drop
J15, J16	Triac Defrost Heater	0.75 - 2VAC voltage drop

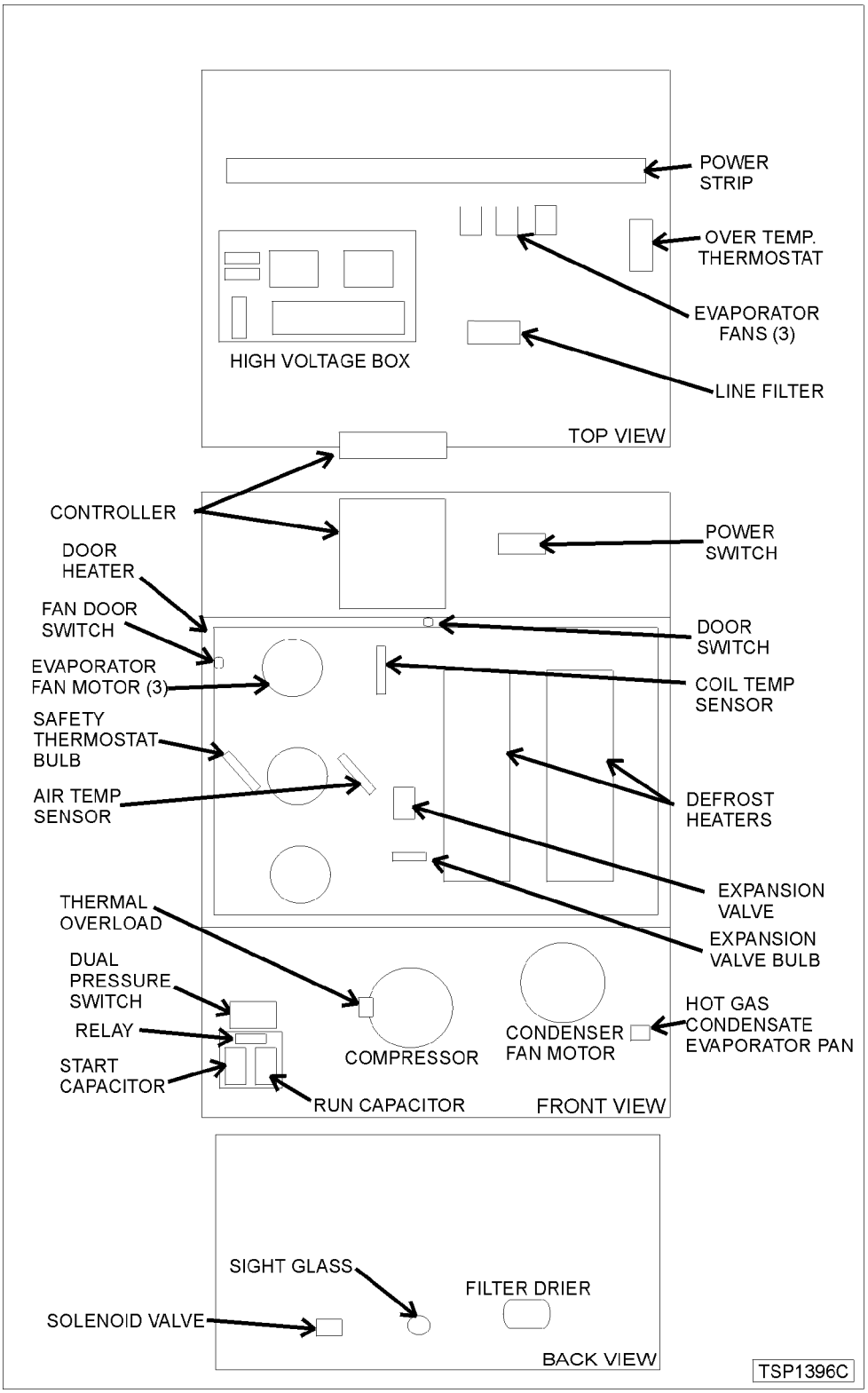
NOTE: Voltage drop readings to be measured while specified component is energized.



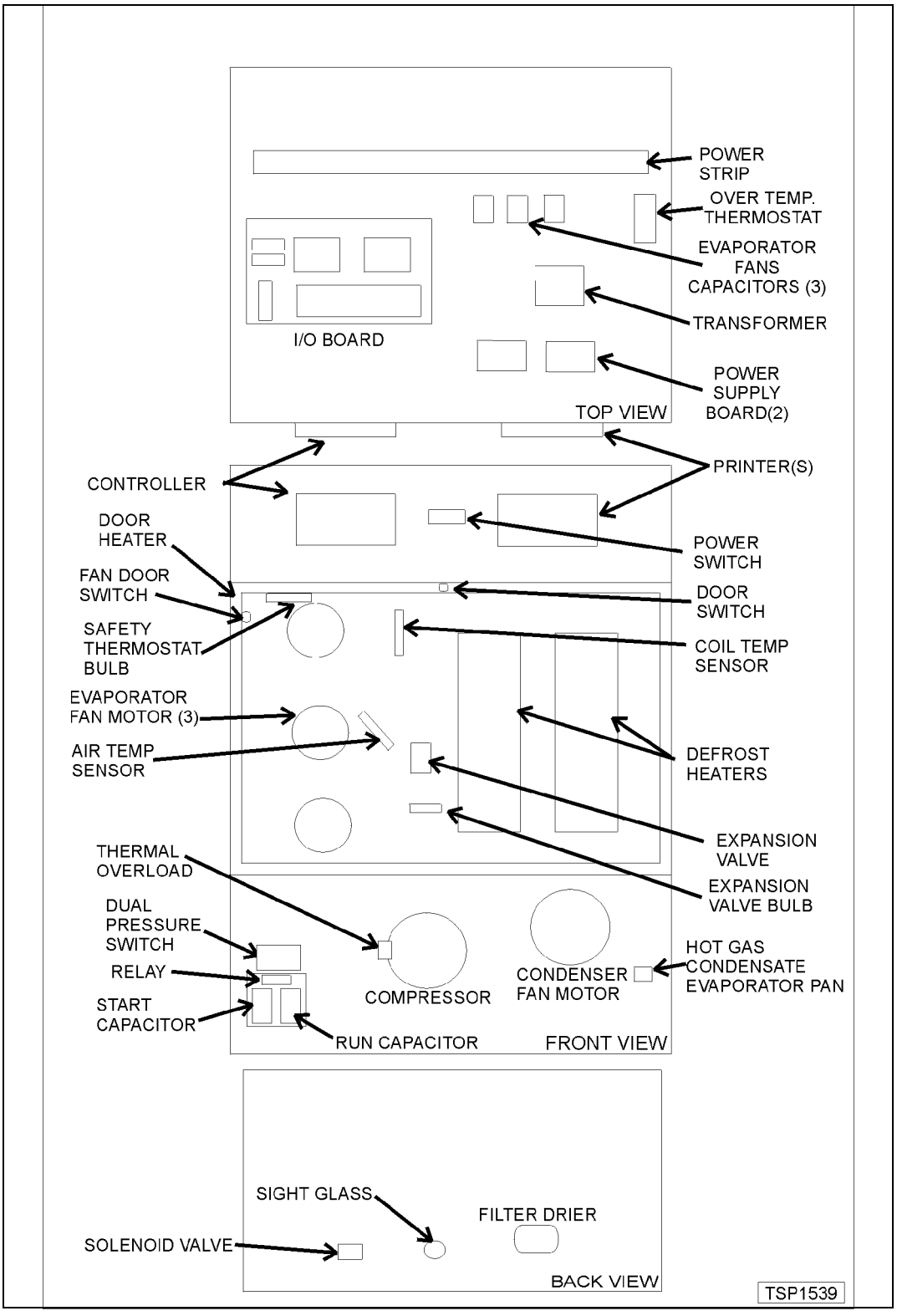
ELECTRICAL OPERATION

COMPONENT LOCATION

Only for HQC45 ML-124059, HQCF45 ML-124060, HQC90 ML-124063



Only for HQC45 ML-124066, HQCF45 ML-124067, HQC90 ML-124068



COMPONENT FUNCTION

Compressor . . . . . Pumps refrigerant through refrigeration lines and components.

Condenser Fan . . . . . Draws air across condenser coil to aid in removing heat from the refrigerant and moves air across compressor to aid in cooling the compressor.

Dual Pressure Control . . . . . Low side monitors suction pressure at compressor. Shuts compressor off when low pressure setting is reached (cut-out). Allows compressor to run when pressure rises to cut-in setting.
High side monitors discharge pressure at compressor. Shuts compressor off when high pressure setting is reached (cut-out). Allows compressor to run when pressure returns to cut-in setting.
The differential is the difference in pressure between opened and closed states of the pressure switch.

Start Capacitor . . . . . Wired in series with the start windings to help start compressor motor .

Run Capacitor . . . . . Continually in circuit to help compressor motor during operation.

Thermal Overload . . . . . Removes power from compressor if the internal temperature of the compressor becomes too high (auto reset).

Relay . . . . . Senses current of run winding of compressor motor. Normally open contacts close when the run winding draws a high amperage at start and brings the start capacitor and start windings into the circuit. As the motor reaches operating speed (less amperage through run winding), the normally open contacts open and removes the start capacitor and start windings from the circuit.

Evaporator Fan . . . . . Draws air from the cabinet and moves the air through the evaporator coil. Air should blow air toward the door.

Defrost Heater . . . . . Defrosts evaporator coil and prevents water droplets from evaporator coil from freezing before they can drain to the condensate pan. Operates only during defrost cycle.

Air Temperature Sensor . . . . . Monitors air temperature inside cabinet.

Coil Temperature Sensor . . . . Monitors the suction line temperature at evaporator during defrost cycle.

Food Temperature Probe . . . . Monitors temperature of food product .

Front Door Switch . . . . . Monitors door for open or closed position. Evaporator fans stop when door is open.

Fan Door Switch . . . . . Monitors evaporator fan compartment door for open or closed position. Evaporator fans will not start if the switch is open. Refrigerant system operation stops after 30 seconds switch has been open.

Solenoid Valve . . . . . Normally closed. When energized ,allows refrigerant to flow from receiver to evaporator coil.

Door Perimeter Heater . . . . . Prevents condensate from forming on door frame.

Door Heater Thermostat . . . . . Monitors door frame temperature. Opens circuit to door frame heater if the door frame temperature exceeds the set point.

Controller . . . . . Performs the following functions:

A. Displays all data for the current mode of operation.
B. Cycles refrigeration system to maintain cabinet temperature.
C. Monitors power failures.
D. Monitors door position.

Power Supply Boards . . . . . Controls power to I/O board and printer(s).

I/O Board . . . . . Performs the following functions:

A. Cycles defrost heaters during defrost cycle.
B. Cycles compressor solenoid to maintain cabinet temperature.
C. Monitors AC monitor to determine loss of power.
D. Closes alarm contact to signal external alarm device, after a malfunction detected.
E. Monitors door switch position.
F. Monitors fan door switch.

Main Contactor . . . . . Controls power to unit electrical circuits once main switch is closed.

Main Switch . . . . . Controls power to main contactor when safety thermostat is closed. Removes power from all components including the controller.

Over Temp. Thermostat (manual reset) . . . . . Monitors cabinet air temperature. Opens circuit to main contactor if cabinet temperature exceeds 155°F.

Safety Thermostat (manual reset) . . . . . Monitors cabinet air temperature. Opens circuit to main contactor if cabinet temperature exceeds 155°F.

SEQUENCE OF OPERATION ML-124059, ML-124060, ML-124063

NOTE: HQC45 (ML-124059,ML-124060) HQC90 (ML-124063) schematics will be used to explain the electrical sequence of operation.

Refrigeration System

1. The controller must be in a chill or hold mode.
2. The controller monitors the air temperature and senses a need for cooling.
    A. The relay that controls the solenoid valve is energized.
        1) Solenoid valve is energized and refrigerant flows to the evaporator.
3. The low pressure switch closes with the rise in pressure.
    A. The compressor motor is energized and refrigerant is pumped through the system.
4. The expansion valve monitors the evaporator superheat and meters the amount of refrigerant entering the evaporator.
5. The controller senses the air temperature requirements have been met.
    A. De-energizes the relay that controls the solenoid valve.
        1) Solenoid valve is de-energized and closes. Refrigerant flow to the evaporator stops.
6. Compressor continues to run. Low pressure control opens as pressure drops.
    A. Compressor motor de-energized.
7. Unit is cycled by controller.

Idle Mode

1. Conditions
    A. Unit connected to correct voltage.
    B. Safety thermostat closed.
    C. Fan door switch closed.
    D. Front door switch closed.
2. Main switch closed.
    A. Main contactor energized, contacts close.
        1) Door heater energized.
        2) Controller energized.
        3) Power to condensing unit controls.
3. Controller goes through power up self diagnostics and displays main menu.

Hold Mode

1. Unit is in IDLE mode.
2. Hold mode is selected.

NOTE: When the hold mode is selected, two timers run. One tracks the time in the hold mode and the other tracks the time since the last defrost (hold mode has a defrost every six hours).

    A. The refrigeration system will cycle on the air temperature of the cabinet.
        1) “On” at the set point plus differential.
        2) “Off” when set point reached.

NOTE: Set point and differential are selected in the set-up menus.

NOTE: If the cabinet door is opened during operation, the evaporator fans and refrigeration system will shut down.

    B. The hold mode has an automatic defrost cycle after every six hours of operation in the hold mode.
        1) When the defrost cycle is complete and the unit returns to the hold mode, the evaporator fans will not operate until the coil temperature is below 25°F.
3. Hold mode is terminated by pressing the stop key.

NOTE: If the HOLD MODE is terminated by the operator with the defrost cycle in progress, the defrost mode will continue until completion before going into IDLE MODE.

    A. Unit reverts back to step 2.

Manual Chiller / Freezer Mode

1. Unit is in IDLE mode.
2. Manual chill is selected and a time is entered.
3. For the first 2/3 of the chilling time, the refrigeration system will cycle on the blasting air temperature set point.
    A. “On” at the set point plus differential.
    B. “Off” when set point reached.
4. For the last 1/3 of the cycle, if “surface protection” has been selected, the refrigeration system will cycle on the new blasting air temperature set point of 28°F. If “surface protection” is not selected, the set point remains the same until the end of the cycle.

NOTE: If the cabinet door is opened during manual chill operation, the evaporator fans and refrigeration system will shut down.

5. Manual chill mode is terminated when time expires.
    A. Buzzer sounds for 2 minutes.
6. If the end of the manual chill cycle is not acknowledge by pressing the yes key, the unit will enter the hold mode.
    A. If the end of the manual chill cycle is acknowledge by pressing the yes key, the unit will enter the idle mode.

Automatic Chiller / Freezer Mode

1. Unit is in IDLE mode.
2. Automatic chill is selected.

NOTE: If the cabinet door is opened during manual chill operation, the evaporator fans and refrigeration system will shut down.

3. Auto chill mode is terminated when all the product probes reach the target chill temperature.

NOTE: An asterisk will be displayed next to the temperature of each probe as they reach the set temperature and the buzzer sounds for 2 minutes (unless the MUTE key is pressed).

    A. If the end of the automatic chill cycle is not acknowledge by pressing the yes key, the unit will enter the hold mode.
    B. If the end of the automatic chill cycle is acknowledge by pressing the yes key, the unit will enter the idle mode.

Defrost Mode

1. The defrost mode can be entered manually from the idle mode or automatically from the hold mode.
2. Defrost cycle is 20 minutes in length or until the coil temperature reaches 50°F.
    A. If the defrost mode was entered from the hold mode, the unit will return to the hold mode.

NOTE: When the unit returns to the hold mode, the evaporator fans will not operate until the coil temperature is below 25°F.

    B. If the defrost mode was entered from the idle mode, the buzzer sounds for two minutes unless the yes key or the mute key is pressed.

Operational Mode Error Codes

MESSAGE	EXPLANATION
Printer Error	Paper speed too slow
Cooling too slow	Air temperature can not be greater than 44°F 30 minutes into the hold cycle.

SEQUENCE OF OPERATION ML-124066, ML-124067, ML-124068

NOTE: HQC45 ML-124066, HQCF45 ML-124067, HQC90 ML-124068 schematics will be used to explain the electrical sequence of operation.

Refrigeration System

1. The controller must be in a chill or hold mode.
2. The controller monitors the air temperature and senses a need for cooling.
    A. The relay that controls the solenoid valve is energized.
        1) Solenoid valve is energized and refrigerant flows to the evaporator.
3. The low pressure switch closes with the rise in pressure.
    A. The compressor motor is energized and refrigerant is pumped through the system.
4. The expansion valve monitors the evaporator superheat and meters the amount of refrigerant entering the evaporator.
5. The controller senses the air temperature requirements have been met.
    A. De-energizes the relay that controls the solenoid valve.
        1) Solenoid valve is de-energized and closes. Refrigerant flow to the evaporator stops.
6. Compressor continues to run. Low pressure control opens as pressure drops.
    A. Compressor motor de-energized.
7. Unit is cycled by controller.

Idle Mode

1. Conditions
    A. Unit connected to correct voltage.
    B. Safety thermostat closed.
    C. Fan door switch closed.
    D. Front door switch closed.
2. Main switch closed.
    A. Main contactor energized, contacts close.
        1) Door heater energized.
        2) Controller energized.
        3) Power to condensing unit controls.
3. Controller goes through power up self diagnostics and displays main menu.

Hold Mode

Product can be held at chilled temperature by selecting hold mode from main menu. Unit will also go into hold mode automatically when all active probes have reached the target temperature when in "By Temp" mode. If a "By Time" mode selected the unit enters hold mode automatically after the time has expired.

1. Unit is in IDLE mode.
2. Hold mode is selected.

NOTE: When the hold mode is selected, two timers run. One tracks the time in the hold mode and the other tracks the time since the last defrost (hold mode defrosts at a programable interval).

   A. The refrigeration system will cycle on the air temperature of the cabinet.
      1) “On” at the set point plus differential.
      2) “Off” when set point reached.

NOTE: Set point and differential are selected in the factory set-up menus.

NOTE: If the cabinet door is opened during operation, the evaporator fans and refrigeration system will shut down.

   B. The hold mode has an automatic defrost cycle after a programable interval of operation in the hold mode.
      1) When the defrost cycle is complete and the unit returns to the hold mode, the evaporator fans will not operate until the coil temperature is below 25°F.

3. Hold mode is terminated by pressing the exit key.

NOTE: If the HOLD MODE is terminated by the operator with the defrost cycle in progress, the defrost mode will continue until completion before going into IDLE MODE.

   A. Unit reverts back to step 2.

"By Time" Chiller / Freezer Mode

1. Unit is in IDLE mode.
2. Chill type is selected and a cycle time is entered then start key pressed.
3. The refrigeration system will cycle on the blasting air temperature set point.
   A. “On” at the set point plus differential.
   B. “Off” when set point reached.
4. If “soft chill” has been selected, the refrigeration system will cycle on the new blasting air temperature set point. If “chill” was selected, the set point remains the same until the end of the cycle.

NOTE: If the cabinet door is opened during By Time chill operation, the evaporator fans and refrigeration system will shut down.

5. Chill mode is terminated when time expires.
   A. Buzzer sounds until muted.
6. At the end of the chill cycle the unit will enter the hold mode.
   A. If the end of the chill cycle is acknowledge by pressing the stop/reset key, the unit will enter the idle mode.

"By Temp" Chiller / Freezer Mode

1. Unit is in IDLE mode.
2. Chill type is selected and a target temperature is entered then start key pressed and probe selected.
3. The refrigeration system will cycle on the blasting air temperature set point.

NOTE: If the cabinet door is opened during By Temp chill operation, the evaporator fans and refrigeration system will shut down.

4. Chill mode is terminated when all the product probes reach the target chill temperature.

NOTE: Once the temperature of the probe reaches the target temperature display will alternate with "DONE", and the buzzer will sound unless muted.

   A. At the end of the chill cycle the unit will enter the idle mode.

"By Product" Chiller / Freezer Mode

1. Unit is in IDLE mode.
2. Product type is selected.
3. Chill type is selected and a target temperature is entered then start key pressed and probe selected.
4. The refrigeration system will cycle on the blasting air temperature set point.

NOTE: If the cabinet door is opened during By Temp chill operation, the evaporator fans and refrigeration system will shut down.

5. Chill mode is terminated when all the product probes reach the target chill temperature.

NOTE: Once the temperature of the probe reaches the target temperature display will alternate with "DONE", and the buzzer will sound unless muted.

   A. At the end of the chill cycle the unit will enter the idle mode.

Defrost Mode

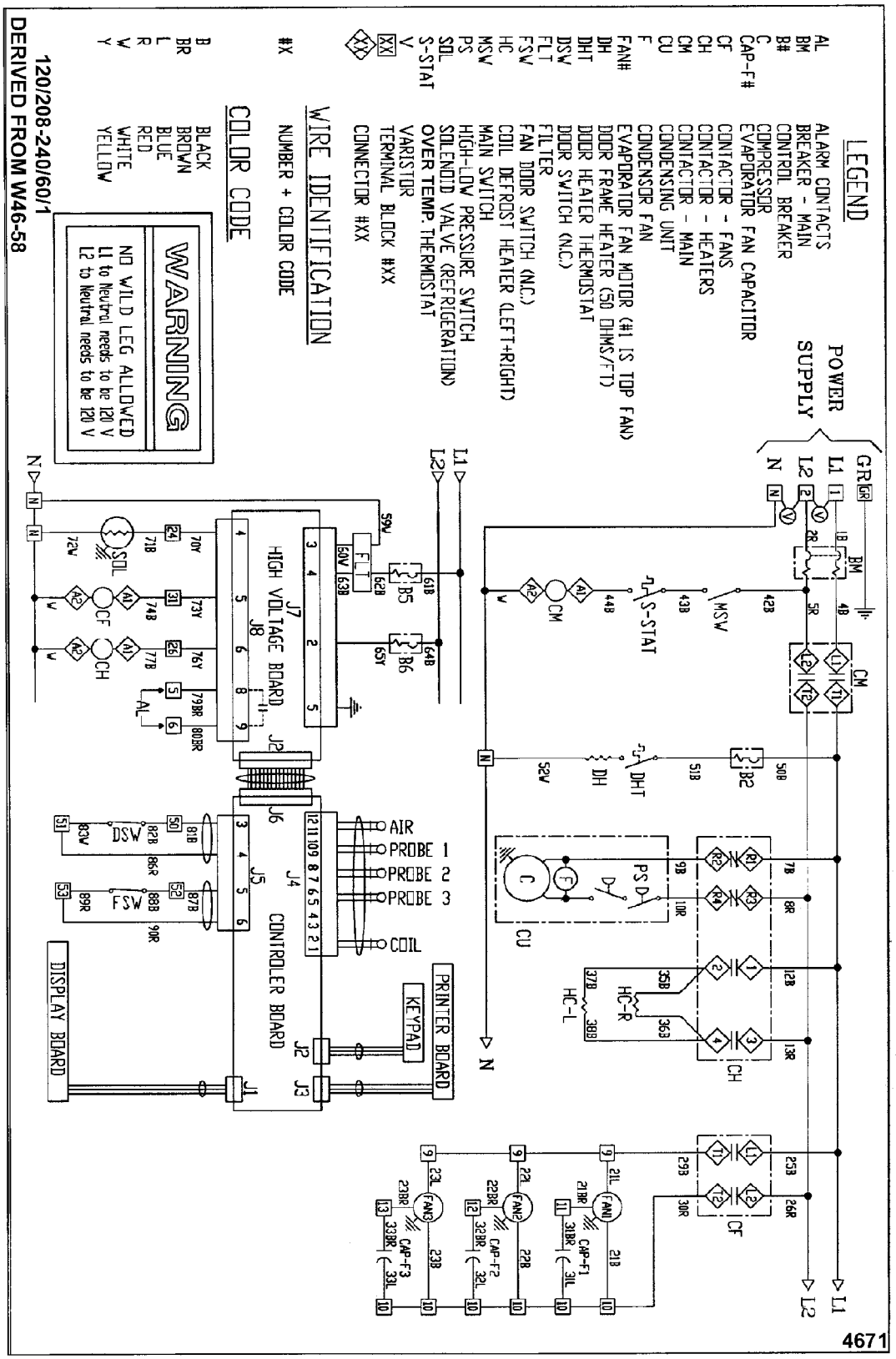
1. The defrost mode can be entered manually from the idle mode or automatically from the hold mode.
2. Defrost cycle length is by set minutes or until the coil temperature reaches set point.

NOTE: Minutes and coil temperature are adjustable in the Factory Settings mode.

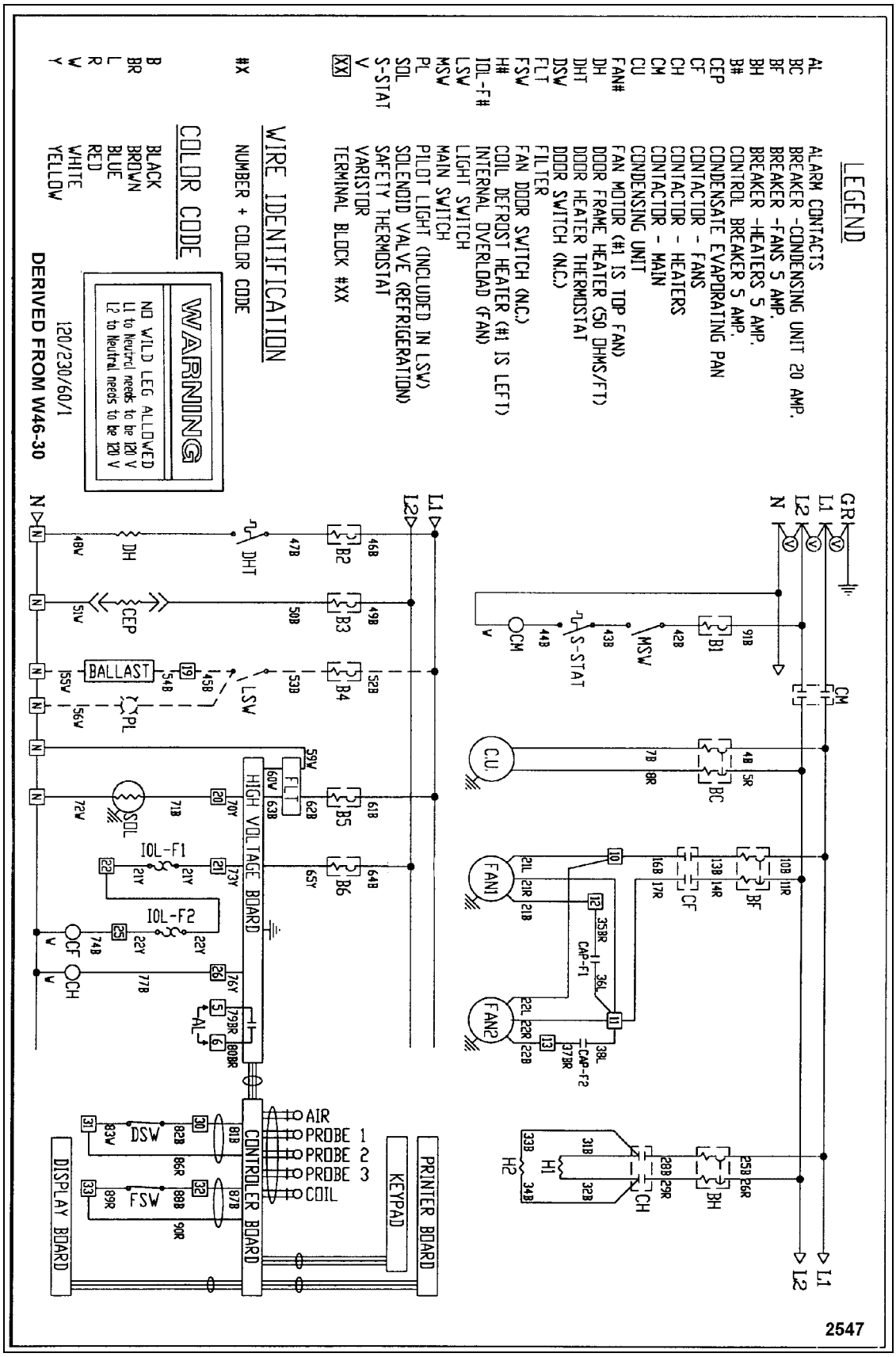
   A. If the defrost mode was entered from the hold mode, the unit will return to the hold mode.

SCHEMATICS

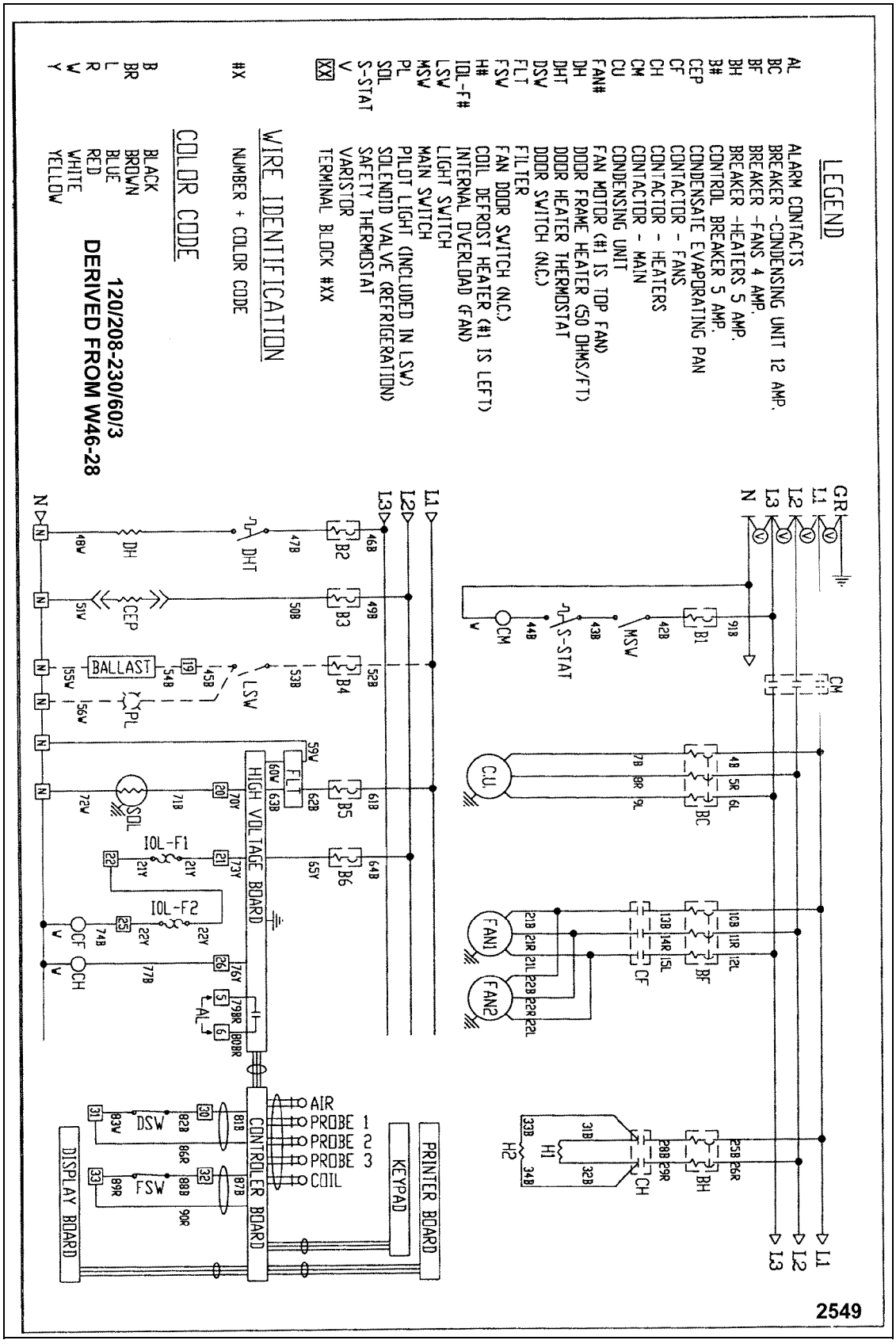
Only for HQC45 ML-124059, HQC(F)45 ML-124060 (120/208-240/60/1)



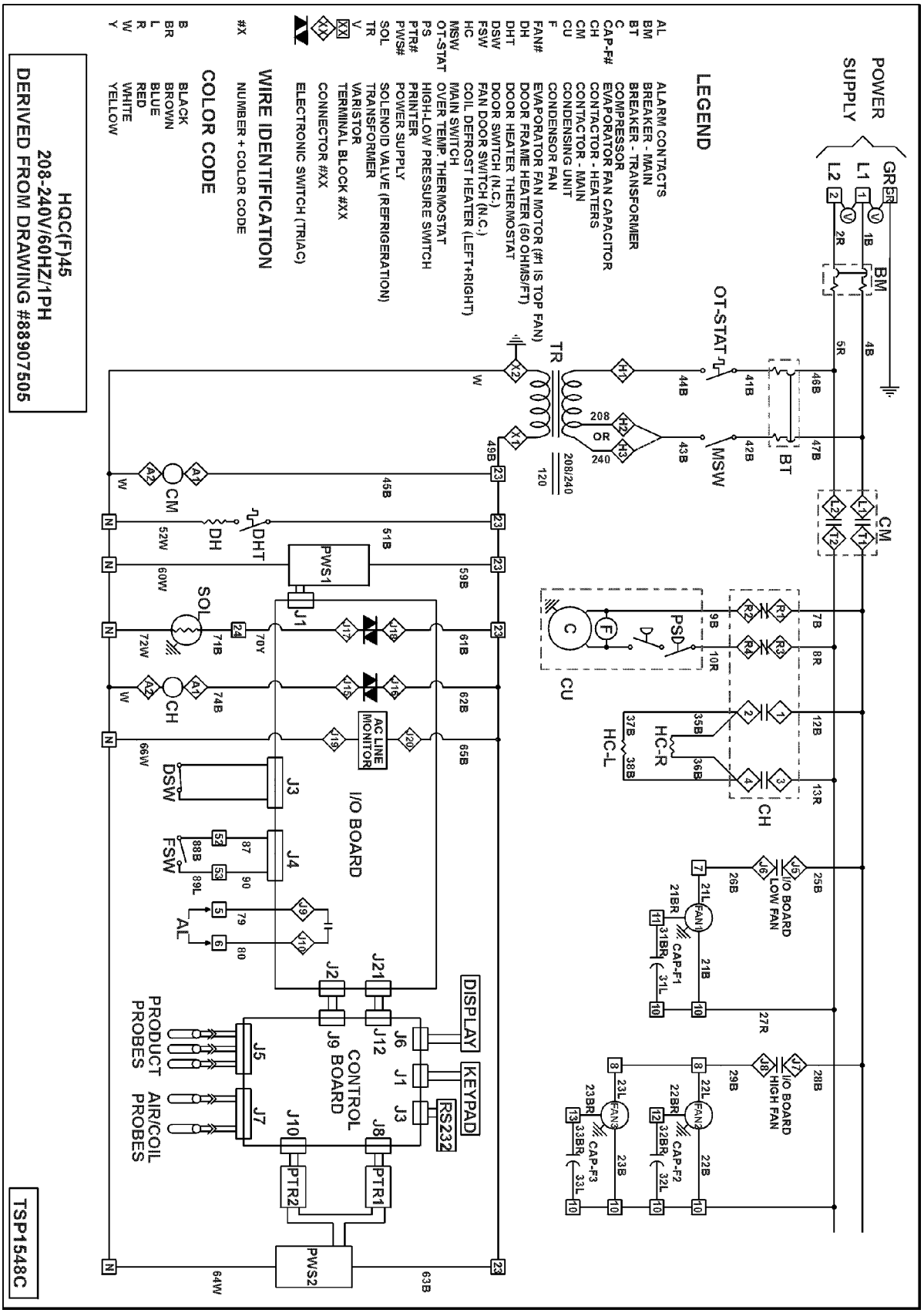
Only for HQC90 ML-124063 (120/208-230/60/1)



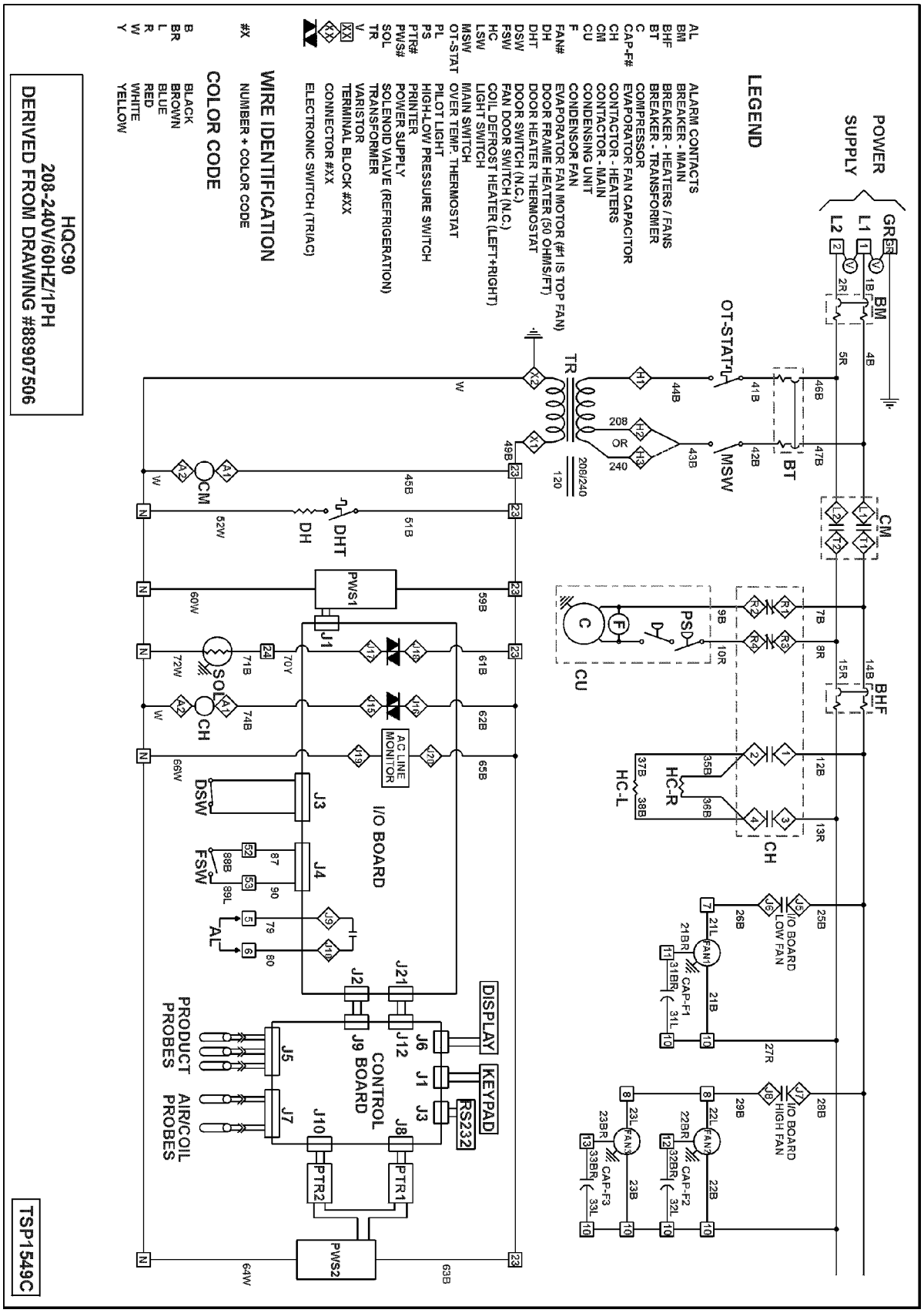
Only for HQC90 ML-124063 (120/208-230/60/3)



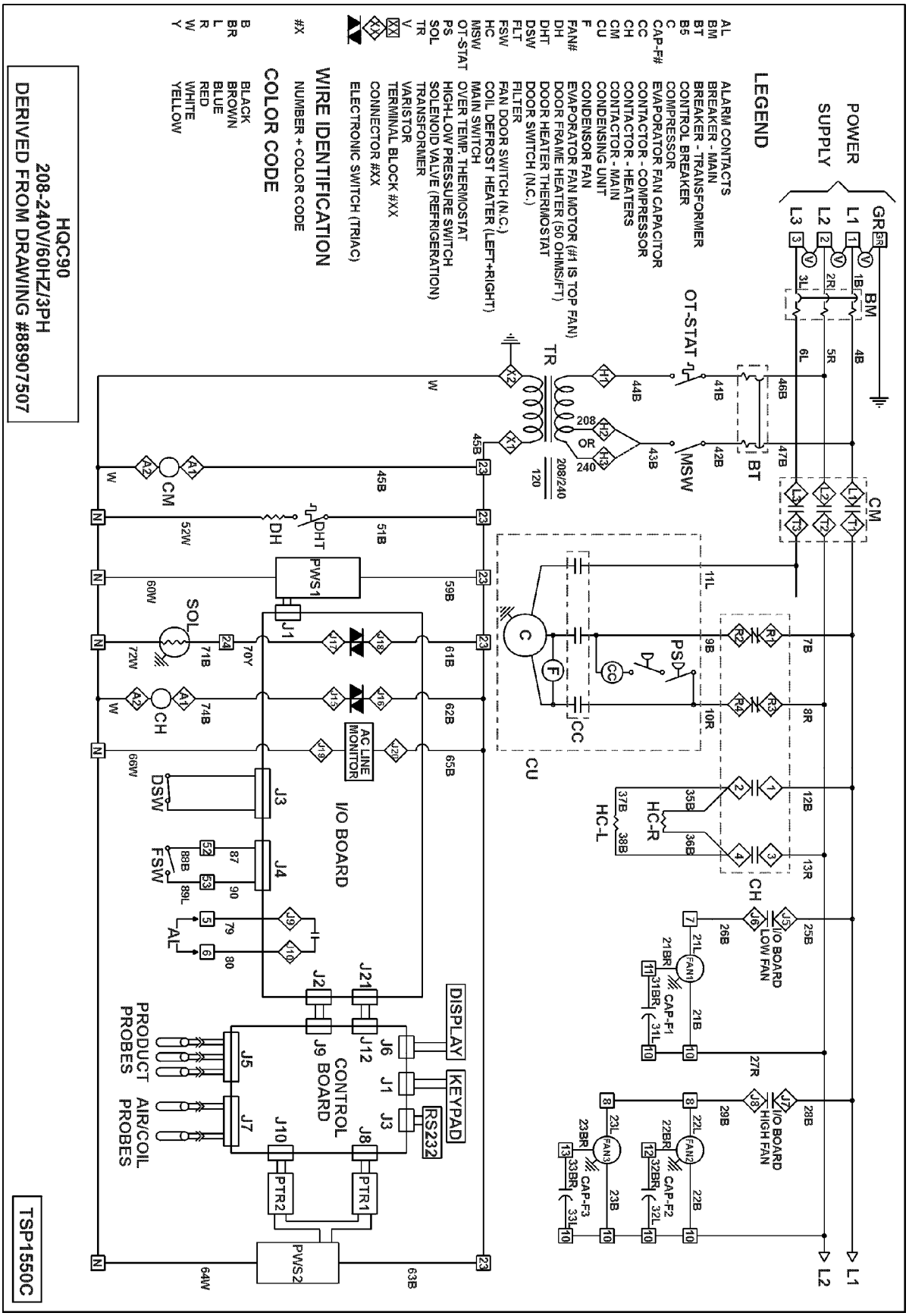
Only for HQC45 ML-124066, HQC(F)45 ML-124067 (208-240/60/1)



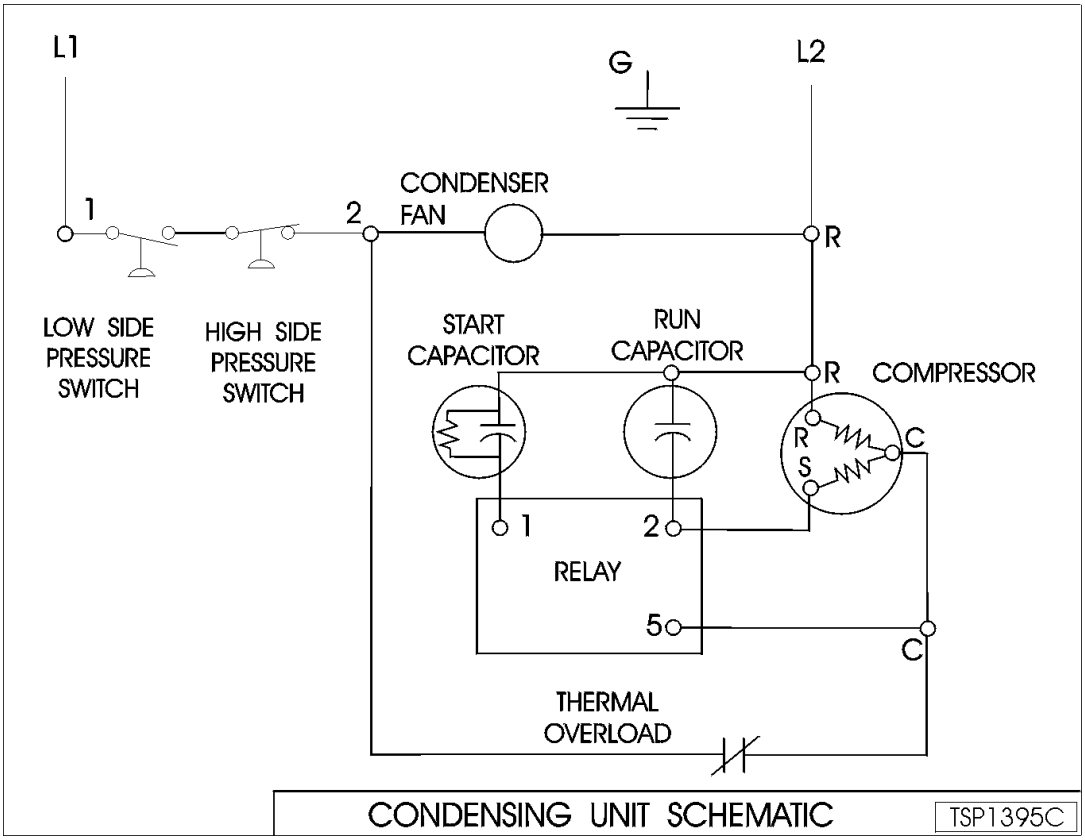
Only for HQC90 ML-124068 (208-230/60/1)



Only for HQC90 ML-124068 (208-230/60/3)



Condensing Unit (Single Phase) for all HQC45, HQCF45, HQC90 Quick Chillers



TROUBLESHOOTING

System Troubleshooting

SYMPTOM	POSSIBLE CAUSES
Compressor will not run, no current draw.	1. Cabinet temperature satisfied. 2. Compressor overload tripped. 3. Anti-Short cycle time not satisfied. 4. Door open or faulty door switch, with message on display. 5. Wired wrong or faulty connection. 6. Air sensor malfunction. 7. Start component malfunction. 8. Low pressure switch malfunction. 9. No refrigerant in system - system leak. 10. Compressor motor windings open. 11. Compressor tripped on manual reset - high pressure. 12. Failed liquid line solenoid valve. 13. Controller malfunction. 14. Power/High voltage board (ML-124059,ML-124060, ML-124063) 15. I/O board malfunction (ML-124066, ML-124067, ML-124068)

SYMPTOM	POSSIBLE CAUSES
Nothing runs, blank controller.	1. Main circuit breaker open. 2. Fuse open on control power supply (ML-124066, ML-124067, ML-124068) 3. Internal circuit breaker open. 4. Control power supply malfunction (ML-124066, ML-124067, ML-124068) 5. Internal temperature over 155°F, over temp. thermostat open. 6. Main on/off switch off.
Compressor will not run, current draw and trips overload.	1. Low voltage. 2. Start component malfunction. 3. Compressor windings shorted. 4. Locked rotor. 5. Excessive head pressure. 6. CPR valve malfunction (ML-124059, ML-124060, ML-124063)
Defrost time too long.	1. Coil temperature sensor failure. 2. Wired wrong. 3. Controller malfunction. 4. One defrost heater failure.
Compressor short-cycles.	1. Improper air flow over evaporator coil. 2. Expansion valve malfunction. 3. Low ambient conditions. 4. Low pressure control inoperative. 5. Failed air sensor. 6. Controller malfunction. 7. I/O board malfunction (ML-124066,ML-124067,ML-124068) 8. Power/High voltage board (ML-124059, ML-124060, ML-124063). 9. Solenoid valve malfunction.
Compressor run time lengthy.	1. Partial loss of refrigerant. 2. High ambient conditions. 3. Improper air flow over condenser coil. 4. Excessive product load. 5. Excessive door openings. 6. Door gasket needs replaced. 7. Air sensor malfunction. 8. Contaminates in refrigeration system. 9. Compressor valve leakage. 10. Expansion valve malfunction. 11. Controller malfunction. 12. I/O board malfunction (ML-124066, ML-124067, ML-124068) 13. Power/High voltage board (ML-124059,ML-124060, ML-124063) 14. CPR valve malfunction (ML-124059, ML-124060, ML-124063)
Continuous unit operation.	1. Loss of refrigerant. 2. Excessive door openings. 3. Sensor malfunction. 4. Low pressure control malfunction. 5. Expansion valve malfunction. 6. Broken compressor valves. 7. Controller malfunction. 8. I/O board malfunction (ML-124066, ML-124067, ML-124068) 9. Power/High voltage board (ML-124059, ML-124060, ML-124063) 10. CPR valve malfunction (ML-124059, ML-124060, ML-124063)

SYMPTOM	POSSIBLE CAUSES
Low suction pressure.	1. Solenoid valve restricted. 2. Restriction in drier. 3. Loss of refrigerant. 4. Poor air flow. 5. Expansion valve blocked. 6. CPR valve malfunction(ML-124059,ML-124060,ML-124063)
High head pressure.	1. Improper air flow across condenser. 2. Extreme ambient conditions. 3. Overcharge of refrigerant. 4. Air in system.
Will not defrost.	1. Defrost heater malfunction. 2. Wired wrong or faulty connection. 3. Relay contacts open. 4. Coil temperature sensor failure. 5. Controller malfunction. 6. I/O board malfunction (ML-124066, ML-124067, ML-124068) 7. Power/High voltage board (ML-124059, ML-124060, ML-124063)
“Printer Error” on display.	1. Paper not feeding correctly. 2. Printer harness. 3. Printer mechanism/printer board error. 4. Printer power supply board.
Display blank.	1. Main power supply. 2. Display harness. 3. Display board malfunction. 4. Power supply to controller. 5. Controller (LED #6) (ML-124059, ML-124060, ML-124063) 6. Controller (LED D1,D2) (ML-124066, ML-124067, ML-124068) 7. Controller P1 plug (ML-124059, ML-124060, ML-124063)
“ERR”, "SHORT" or "OPEN" on display where temperature is normally displayed.	1. Probe open. 2. Wire connections. 3. Controller malfunction. 4. Out of range, actual temperature range (-40°F. To 200°F.).
Printer does not print test.	1. Controller malfunction. 2. Printer malfunction. 3. Printer power supply board malfunction.
Printer output is not recognizable.	1. Controller malfunction.
Printer does not print (operator mode).	1. Printer out of paper (message on display). 2. Printer malfunction. 3. Printer power supply board malfunction. 4. Controller malfunction.
No response from keypad.	1. Controller (LED #6) (ML-124059, ML-124060, ML-124063) 2. Check keypads.

Product Troubleshooting

SYMPTOM	POSSIBLE CAUSES
Product not chilled.	1. Product temperature probes not located correctly or sensor malfunction. 2. System malfunction. Refer to “SYSTEM TROUBLESHOOTING”. 3. Control Box malfunction.
Product frozen at edges.	1. Product too thick in pans. 2. Too long of run time in Manual Chill Mode. 3. Surface protection option not selected (ML-124059,ML-124060, ML-124063) 4. Soft Chill Mode not used (ML-124066,ML-124067,ML-124068) 5. Sensor/probe malfunction. 6. Controller malfunction. 7. Power/High voltage board (ML-124059,ML-124060,ML-124063) 8. Too cold blasting air selected.
Taking too long to chill.	1. Product too thick in pans. 2. Surface protection option selected (ML-124059,ML-124060, ML-124063) 3. Soft Chill Mode used (ML-124066,ML-124067,ML-124068) 4. Sensor/probe malfunction. 5. System malfunction. Refer to “SYSTEM TROUBLESHOOTING”. 6. Too warm blasting air selected.

CONDENSED SPARE PARTS LIST

PART NO.	DESCRIPTION
00434319	Board, IO, Assembly
00434313	Board, PC Control, Assembly
00434359-1	Supply, Power-Control
00434359-2	Supply, Power-Printer
00434361	Printer
00434317	Display, VFD, Serial
00434333	Switch, Membrane Keypad
00434330	Probe, Assembly, Product
00434330-2	Probe, Assembly, Product
00434331	Probe, Assembly, Coil
00434408	Individual Label, Stock
00434409	Printer Paper
00434330	Probe, Assembly, Product
00630181-29	Door Switch
00630183-70	Door Frame Heater HQCF45
00630181-7	Door Frame Heater HQC45, HQC90
00630183-54	Thermostat-Door Frame Heater
00630180-65	Hinge Spring Assy.
00630183-10	Fan Door Switch
01-016836	Defrost Heater
00630153-43	Door Gasket
00630152-84	Shelf Clip
01-019997	Shelf
00630184-8	Pressure Switch